$1.00 per copy

59
JUN
vol. 4
no. 6

concrete construction

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SENT
YOU
THLY
BY

The Worth of Integrity

The two samples of plastic concrete pictured here are to all outward appearances identical—the color, texture and consistency are virtually the same, and no ordinary visual inspection, however carefully made, will give the user any useful clue concerning the quality of the two materials. Every knowledgeable user of concrete realizes, however, that the quality and performance of these apparently identical materials may differ widely. One may produce sound, strong and durable concrete and the other may fail completely to satisfy the specification for which it was produced.

How, then, can the user of concrete protect himself and his customers against the inconvenience and loss of time and money which always result when materials fail to perform properly? He can, of course, at great expense and trouble acquire and operate his own facilities for producing concrete, or he can do business with an established producer of ready mixed concrete who has a reputation for honesty and integrity.

It might be argued that it is every bit as difficult to judge the honesty of men as it is to predict the performance of the materials they produce, since honest men and scoundrels may look just as much alike as good concrete and bad. But men, far better than materials, may be assayed on the basis of past performance, and we think it is precisely this fact that has made possible the tremendous growth of the ready mixed concrete industry.

The ready mix producer is no fashioner of miracles. He holds no basic patents or keys to obscure mysteries, and he owns no facilities or skills not entirely accessible to everyone else. His only real stock in trade is his basic integrity and his reputation based on past performance. Without these essential ingredients the ready mixed concrete industry could never have grown and prospered as it has, for this is not a one-shot supply operation with platoons of new and innocent customers waiting in line to take the place of the disillusioned.

The ready mix producer must continue to sell month after month and year after year to customers who are familiar through first hand experience with his integrity, skill and knowledge of his craft. There is in the long run no better way in the world for the user of concrete to resolve all his doubts concerning this material than on a qualitative appraisal of the men who produce it.

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View of the Paris Exposition Palace during the final stages of construction. With its span of 715 feet, the shell roof is by far the longest clear-span structure of its type ever built.

WORLD'S LARGEST ROOF— concrete, of course

Concrete shell near Paris has clear spans of 715 feet, and covers more than 5 acres

MANY CONCRETE MEN have already heard about the incredible concrete shell roof now nearing completion in Paris. The roof has by far the longest clear span in the world—approximately 715 feet—and is perhaps the clearest demonstration yet of the almost unlimited capabilities of concrete shells. The roof is composed of two parallel shells, one above the other, each only 2½ inches thick and joined by precast webs and diaphragm ranging from 6 to 9 feet high. It covers a column-free area of some 225,000 square feet, more than 5 acres.

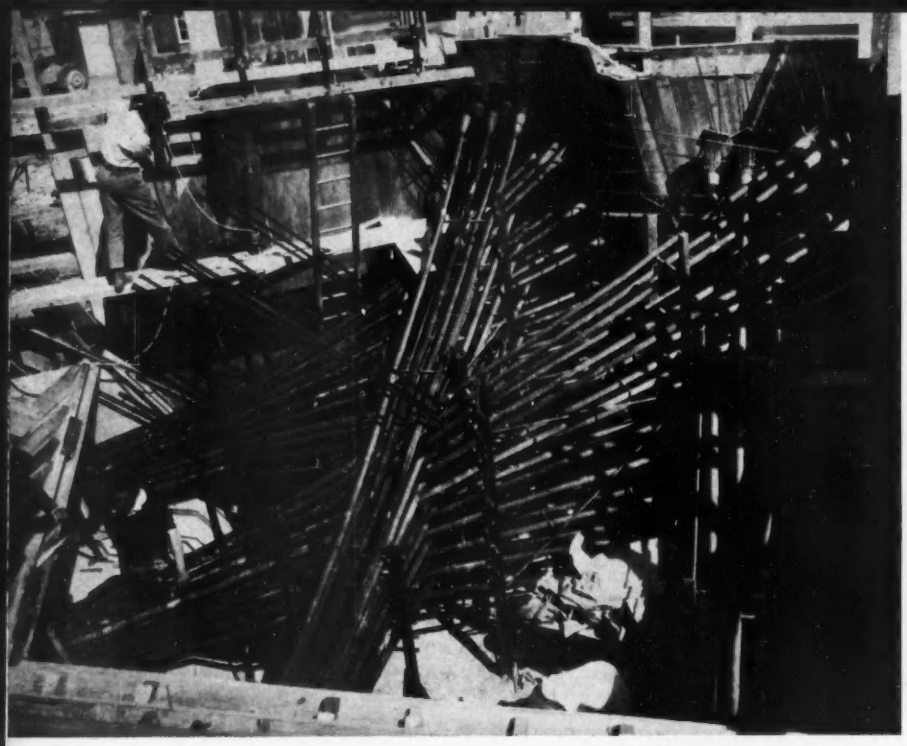
The unique engineering and construction problems created by a roof of this unprecedented size, and the highly satisfactory solutions found for them, are of considerable importance to the designers and builders of large shell roofs in this country. The fact that the design of the building chosen as most economical and architecturally acceptable was all concrete—involving cast-in-place, precast, and prestressed concrete—is also of great significance.

The roof is for the Exposition Palace of the National Center of Industries and Technology in Paris. The Exposition Palace is the first unit in a large development to concentrate all the professional services of large industries in France to form a permanent exhibition center and technical museum. The Palace will be used primarily for the exhibition of machinery and industrial equipment and products.

Sponsors of the project wanted a truly monumental and striking structure which would be a symbol of achievement in construction. The architects decided upon a triangular structure covering a huge area. Other requirements limited the height of the roof—which has a rise of 150 feet as built—and demanded complete utilization of the land provided. A ceiling on expenditures was set and construction time was limited to 21 months.

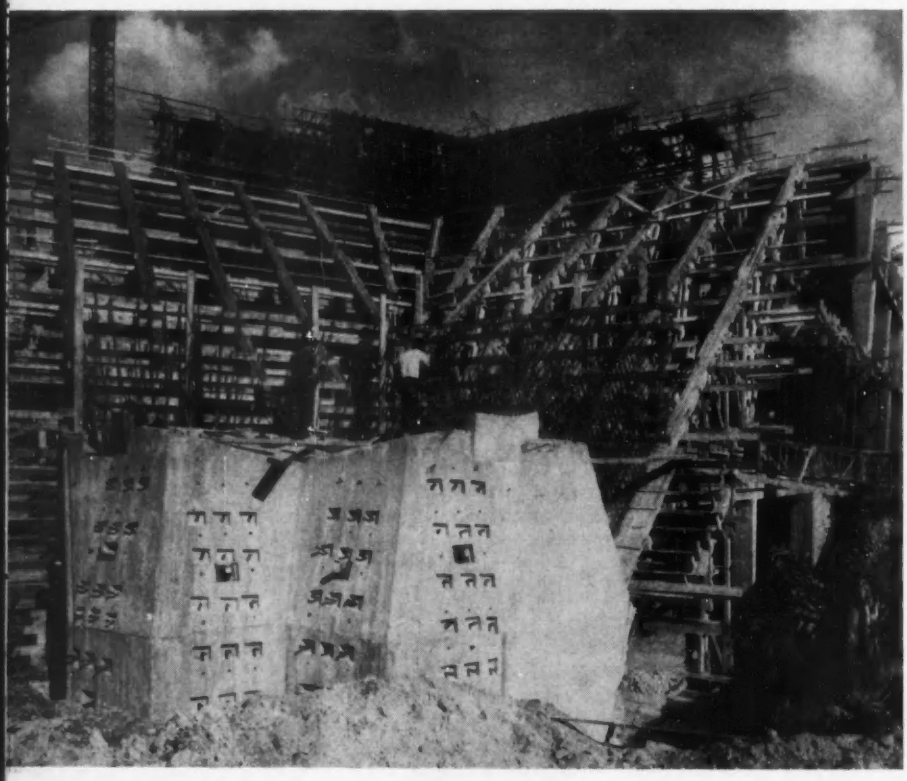
These requirements for a building involving 290,000 square feet of exhibition area for heavy machinery and 800,000 square feet of other floor area posed a tremendous challenge for the designers and builders.

Seven designs were submitted by different engineering firms to meet the requirements for the building. Three



View of the reinforcing for the prestressed concrete members used to tie the abutments together as a means of counteracting the horizontal thrust of the roof. These members angle downward for about 135 feet from each abutment to anchorages below the basement level.

Construction began with the floors, the tie members and their anchorages, with portions of the floors near the abutments being completed as soon as possible so that cranes could be placed on them for construction of the roof.



were of structural steel, three of reinforced concrete, and one a composite of concrete and steel. The concrete design, finally chosen and built on the basis of economy and architectural effectiveness, is a model of the best use of concrete as a structural material. In many respects the design resembles that of an aircraft wing or fuselage.

Because of the size of the roof, the critical factors in its design were weight and safety. Two single-shell designs were investigated, but both were rejected on the basis of an insufficient safety factor. In a roof of this size, buckling is a critical factor, and heavy ribs or trusses would have been necessary to stiffen a single shell. It also would have been sensitive to small inaccuracies in construction or differential loads. By building the roof of two parallel shells, the buckling problem was overcome, while still using only the same amount of concrete that would have been required in single shells. The shells are also corrugated to provide resistance to local buckling without the use of numerous internal braces.

The two shells are connected by precast diaphragms. Radial webs, running from the buttresses to the peak along the bottoms of the corrugations, are 22½ feet apart at the peak and converge toward the buttresses. Transverse diaphragms are spaced 29½ feet apart. Their function is to add rigidity to the structure and to equalize loads which may be hung from the lower shell. The diaphragms are only 2.36 inches thick except at the peak and the facades, where heavier cast-in-place diaphragms were required. Square openings cut in the diaphragms and webs provide ventilation, free access to all portions of the roof, and space for utilities.

Because maximum utilization of the site was a requirement, it was necessary to build the abutments at the very edge of the site. The foundation soil was excellent and the thrust of the roof could easily have been transmitted to it through heavy foundations. However, it was assumed that a subway would be built adjacent to the site in the future, so foundations could not extend beyond the edge of the site. It was thus necessary to tie the abutments together to counteract the horizontal thrust of the roof. The heavy tie members were constructed of prestressed concrete. They are angled down for about 135 feet from each abutment to anchorages which hold the central por-

tion of the members below the basement level. The anchorages are also prestressed. Each anchorage is designed to withstand an upward pull of 800 tons. Each of the tie members, which resist all the outward thrust of the roof, is capable of resisting a pull of 3,700 tons.

The floors, including the main floor which is designed for a live load of some 200 pounds per square foot, are constructed of triangular precast elements. The main floor is supported on cast-in-place beams of nearly 60-foot span, and is prestressed at two levels in three directions. The arrangement permits substantial overloads on individual floor slabs because the restraint of adjacent slabs produces an "arching" effect in the loaded slab.

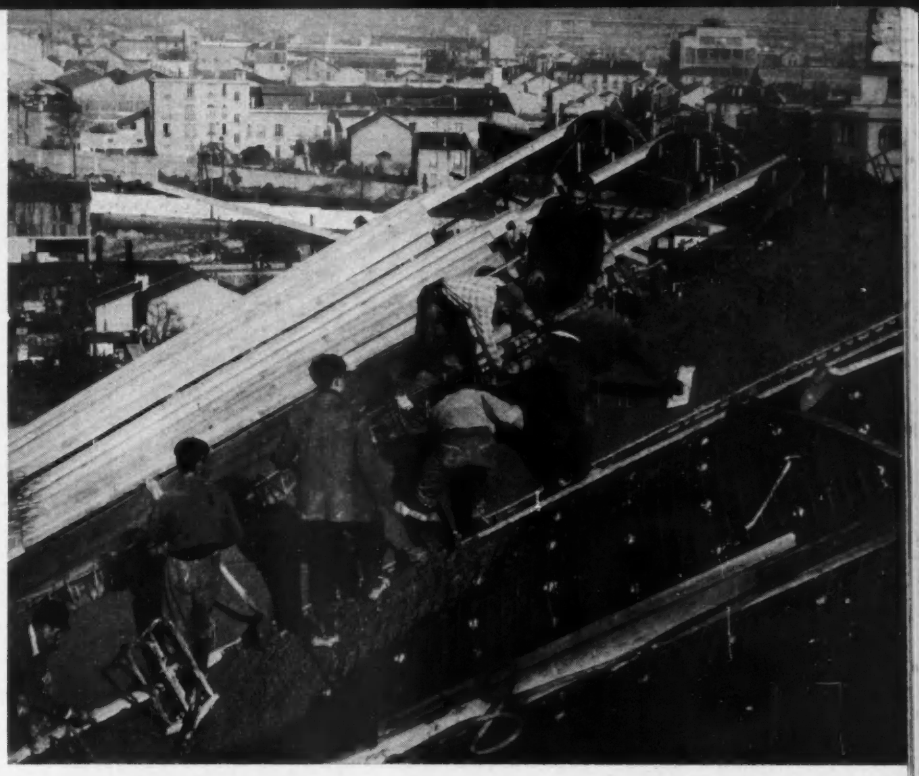
Construction of the vault, like its design, involved many problems simply because of its size. The limitation of construction time to 21 months required maximum efficiency in scheduling. It was impossible to recruit the same 800 skilled workers who would have been needed if ordinary methods had been used, and space at the construction site was totally inadequate. It was necessary, therefore, to make maximum use of precasting off the job site.

With the methods adopted, the labor force at the site never exceeded 300 men and about 50 men were employed at the precasting plant during half the construction period.

Construction began with the floors, the tie members and their anchorages. The tie members were not prestressed until portions of the roof were completed and de-centered. Portions of the floors near the abutments were completed as soon as possible so that cranes could be placed on them for construction of the roof. There are four stories of floors at the facade; cranes were placed atop the highest level for construction of the main portions of the roof.

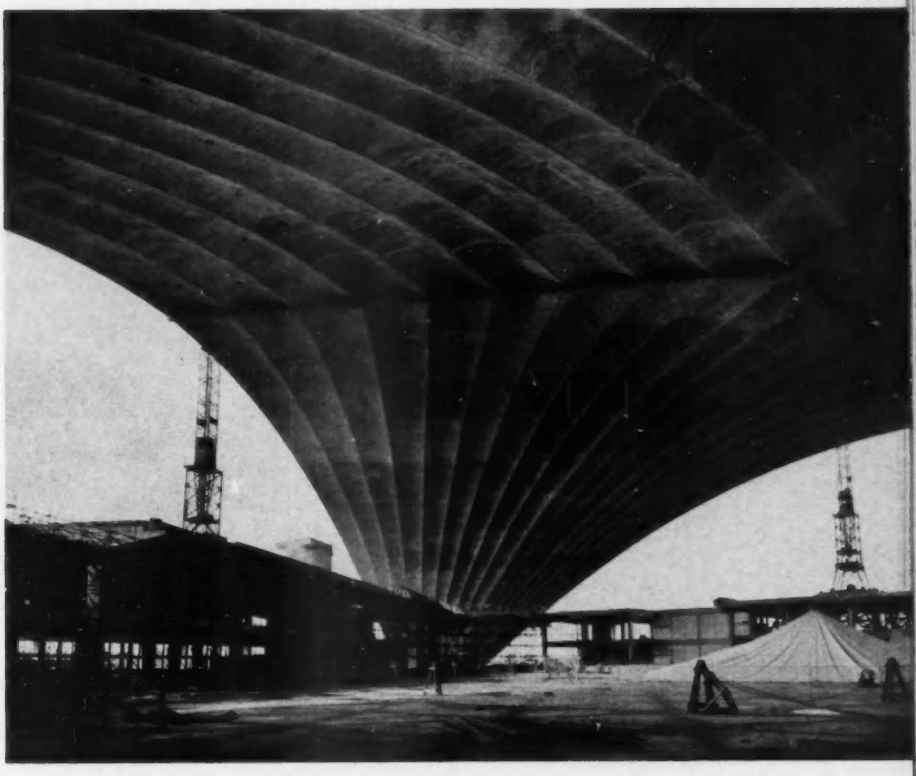
The roof itself was constructed in six stages, each composed of three corrugations from each of the three abutments. But before the main sections of the roof were cast, the springings, extending about 36 feet from the center of the abutments, were cast. At this point, 36 feet from the abutments, jacks were placed which were later used in an unusual method of decentering.

The forms for the lower shell were supported on tubular scaffolding—185 *miles* of it. Wooden trusses atop the



Workmen placing and finishing concrete on the steep slope of the shell. Because of the tremendous distances and heights involved, many of the men on the project lived in special quarters provided near the top of the roof.

View of the lower shell from below shows clearly the corrugations which provide resistance to local buckling without the use of numerous internal braces.



Here, shown in position on the lower shell, are some of the precast diaphragms with which the two shells were connected. These members are only 2.36 inches thick, except at the peak and the facade, where heavier cast-in-place diaphragms were required.

scaffolding supported the forms. The lower shell was cast in sections 29½ feet long, with open spaces left into which were fitted the webs and membranes. These were joined to the shell by careful lapping of reinforcing and grouting.

Shoring was then placed on the lower shell to support 1½-inch thick cement-base fiberboard panels which served as forms for the upper shell and were left as insulation. The two shells and the fiberboard provide excellent thermal and acoustical insulation, with a k factor of .86.

The upper shell was cast in sections 59 feet long. Its top surface was enriched with cement and thoroughly compacted, since no roofing was applied to it. The use of dense concrete for a roof without built-up roofing is a practice not uncommon in Europe. The roof was painted with a light-colored polyester-base paint to improve appearance, reflect sunlight better to reduce heating of the upper shell, and improve the durability of the surface.

When the three-corrugation sections had been completed from each of the three abutments and joined at a very strong crown wall at the center of the vault, the delicate operation of de-centering was begun. This involved coordinating the de-centering jacks, which lifted the lower shell off the scaffolding; the stressing of the underground tie members, which took the outward thrust of the roof as it was lifted off the scaffolding; and removal of the shoring between the lower and upper shells. All of these operations had to be closely coordinated so as to avoid overstressing any portion of the structure.

Placing the de-centering jacks near the bottom of each shell segment, rather than at the peak of the roof between the three shell segments, proved advantageous since the entire shell was lifted off the forms. With the usual method, the upper portion of the roof is lifted off the forms, but the portion near the abutments is lifted very little.

After de-centering, the space between the jacks was concreted, the jacks were removed, and the balance of the area was filled in with concrete.

Successive construction sections were left unconnected for several months to allow the differences in creep between newer and older sections to become very small. The joints were then concreted to produce a completely monolithic structure.

An interesting sidelight, which again emphasizes the enormous size of the roof, is the way runoff water is handled. During a heavy storm, runoff water at each of the three abutments may reach a volume of 5,600 gallons per minute. To handle this volume of water, it was necessary to provide a sort of ski-jump discharge similar to a dam spillway, and large concrete basins, each of which discharges into the sewer system through two 2.6-foot diameter pipes.

The building was designed by Boussiron Enterprises, Paris, Nicholas Esquillan, Technical Director. Construction was done by collaboration of three firms: Balency and Schuhl; Boussiron; and Coignet. Most of the material for this article was obtained from a paper recently presented by M. Esquillan at a joint meeting of the American Society of Civil Engineers and the International Association for Bridge and Structural Engineering.

END

CONCRETE CONSTRUCTION MAGAZINE

P.O. Box 444 Elmhurst, Illinois

TErrace 4-5110

pacific coast representatives
DUNCAN A. SCOTT & CO.
Los Angeles 57
1901 West 8th St., Dunkirk 8-4151
San Francisco
85 Post Street, Garfield 1-7950

WILLIAM M. AVERY
editor and publisher

JOHN M. ENGLE
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CLARISSA B. McKNIGHT
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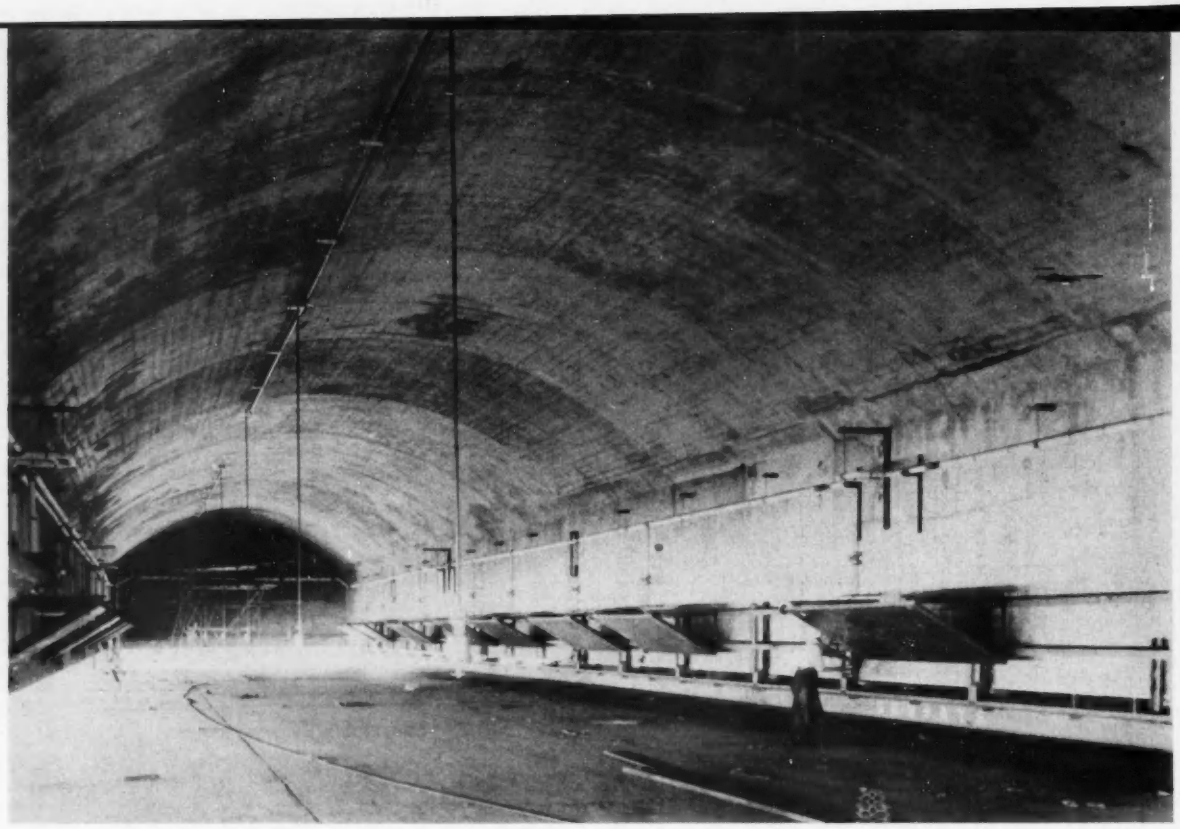


One of the sections of the hangar after the site precast barrel sections had been raised. Panels mounted on the sidewalls are for radiant heating.

LIFT 1400-TON CONCRETE ROOF SHELLS

A THREE-BAY CONCRETE HANGAR being constructed for the British Air Ministry at an R. A. F. Transport Command airfield utilizes a roof erection method which is new to Britain and which has been employed only once (and then in modified form) anywhere in the world. The method involved casting on the ground a 180-foot long by 120-foot wide prestressed concrete barrel vault roof for each bay and jacking the resulting 1400-ton sections to an ultimate height of 46 feet by means of four 200-ton capacity hydraulic jacks at each corner.

When the first of the roof sections was raised to an initial height of 2 feet 8 inches so that the sub-contractors could finish their work upon it before it was raised higher, lifting operations were co-ordinated by walkie-talkie. At no time was any part of the roof allowed to be more than one inch out of level.

In each of the three similar bays of the hangar, which are linked by two 36-foot wide bays, the three vaults run in a longitudinal direction. As each roof is supported only by a column at each corner, there is a clear floor area of 613 feet by 103 feet within the hangar.

Roof construction was begun after the laying of the foundations, hangar floor, entrances and aprons. The roof beams were poured directly on the hangar floor, building paper being laid down to prevent adhesion. Each roof consists of a box beam on each longitudinal face, two valley beams separating the three barrel vaults, with gable beams enclosing each end.

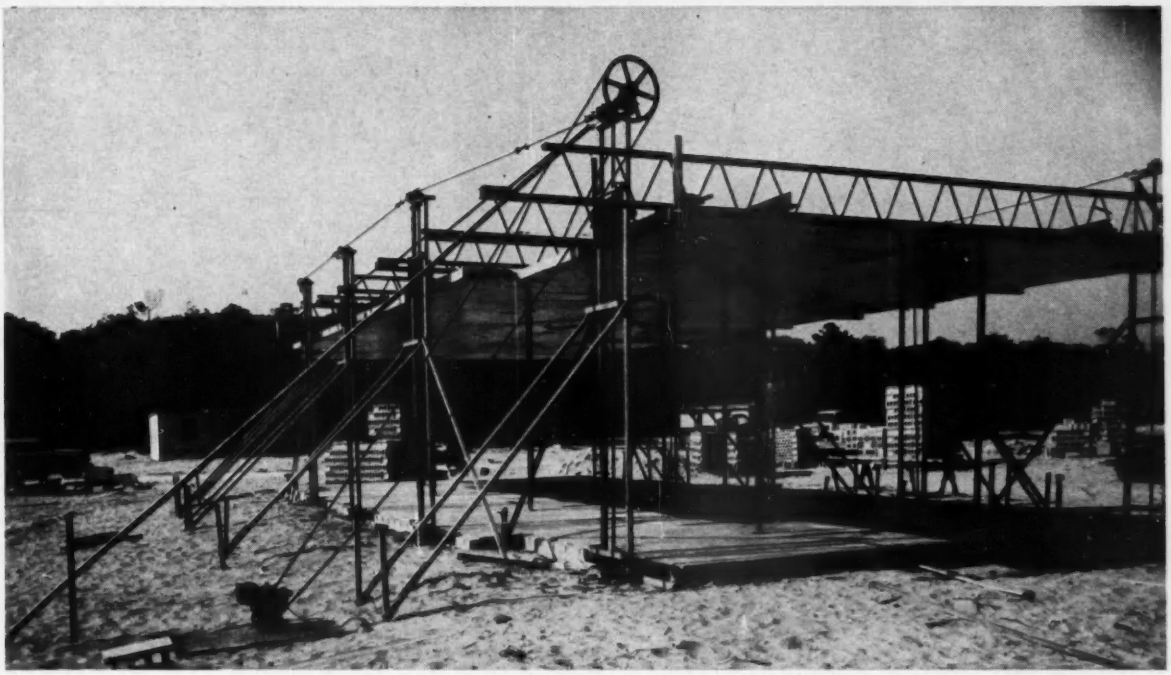
To get over the difficulty of threading the prestressing wires throughout the extreme length of the beams, they were laid out full length and sheathed so that they could be built in as the work proceeded. In all, 39 miles of prestressing wire were used for each roof. Tensioning of the prestressing cables was subsequently co-ordinated by walkie-talkie radio. In the first of the three roofs to be completed 72 cables were stressed before the initial lift. The remaining 34 cables were stressed after the roof was supported on sliding plates 2 feet 8 inches above the ground.

Each vault was concreted in four sections with the use of traveling formwork. Much of the concrete was placed by means of a 5-ton electric derrick crane and side discharge buckets. This eliminated the need for a great deal of scaffolding. Adding to the complexity of the concreting was the thinness of the roof structure and the number of prestressing cables and reinforcing rods to be contained within the concrete. In places the 3¼-inch thick concrete shell contained five layers of reinforcement.

External percussion vibration with pneumatic tools was used to consolidate the concrete of the box beams. For the shell and elsewhere, consolidation was achieved by hand-ramming.

Simultaneous with the construction of the roofs, 1,000 T-shaped sections, each weighing ½ ton, were cast on the site for the 12 columns. END

FILE: Thin Shell



TEN JACKS, 5 on either side, raise 15-ton roof slab 1½" per minute. Steel joists hold slab rigid. Construction Service Co., Isle of Palms, S.C., contractor.

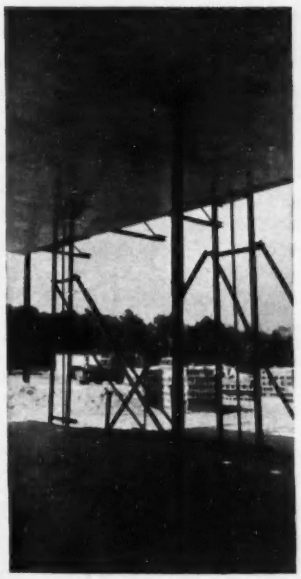
Homebuilder raises the roof; lowers his costs

BY POURING the roof slab on top of the cast-in-place floor slab, then jacking it up to erect the exterior walls, this builder reduces the cost of its inexpensive South Carolina vacation bungalows by $1,200, or nearly 30%.

The forms are 8" deep. Truck mixers first pour the 4" floor slab. After this slab is cured, a plastic sheet is laid, and another 4" of concrete poured into the same forms for the roof slab.

When cured, the 15-ton, 23' x 32' roof slab is raised 1½" per minute to a height of 9' by screw jacks. A 2½ hp gasoline engine, on each side, turns a chain and sprocket driving a horizontal shaft at the top of each set of jacks. This raises the jacks by worm gears. 8" concrete block exterior and partition walls are then built, the roof is lowered into place, covered, and the job is done. Total time: 2 weeks.

This fast-paced job requires on-schedule, monolithic pours of properly processed material, direct into forms, requisites which are met by using truck mixers of certified design, capacity, mixing speed and water control accuracy.



SECOND POUR: Roof slab is poured on top of cured floor slab. Job-built electric vibrating screed is used to strike off and compact slab. Floor slab is reinforced with 6 x 6 —10/10 welded wire fabric, roof slab with 3 x 8—3/8 wire.

←

ONE DAY TO GO: Exterior and partition walls are built in single day. Temporary posts are placed under roof slab as safety measure. Note high finish on ceiling, another benefit of pouring concrete over plastic film.

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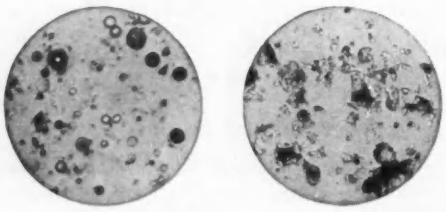

In addition to its chemical actions improving the concrete, Fly Ash increases the fine fines in the mix and literally gives it "ball bearings" that speed placing and finishing. In the highly magnified views above note the rough, irregular particles of cement (right) contrasted with the smooth balls of Fly Ash (left). They show why Fly Ash in the mix makes it "roll" into place better.

Fly Ash in the mix greatly reduces "honeycomb" effect, saves a lot of going back to the job to fix that condition. It makes a less porous concrete, less subject to cracking, more watertight.

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construction industry forms joint conference

Labor and management in the construction industry have announced a plan to tackle their mutual problems, to promote the welfare of the building and construction industry in the public interest, and to preserve and promote the contract method in construction.

Announcement of the formation of the Construction Industry Joint Conference followed a joint meeting of general presidents of national unions engaged in the construction industry and executives of national associations of general and specialty contractors.

Details of the plan were worked out over a two-month period by a 16-man negotiating committee set up at a construction industry labor-management meeting on January 28, 1959. The objective of the Joint Conference is to promote the welfare of the building and construction industry in the public interest. It is designed to preserve and promote the contract system. It seeks improved performance and productivity by contractors and by workers.

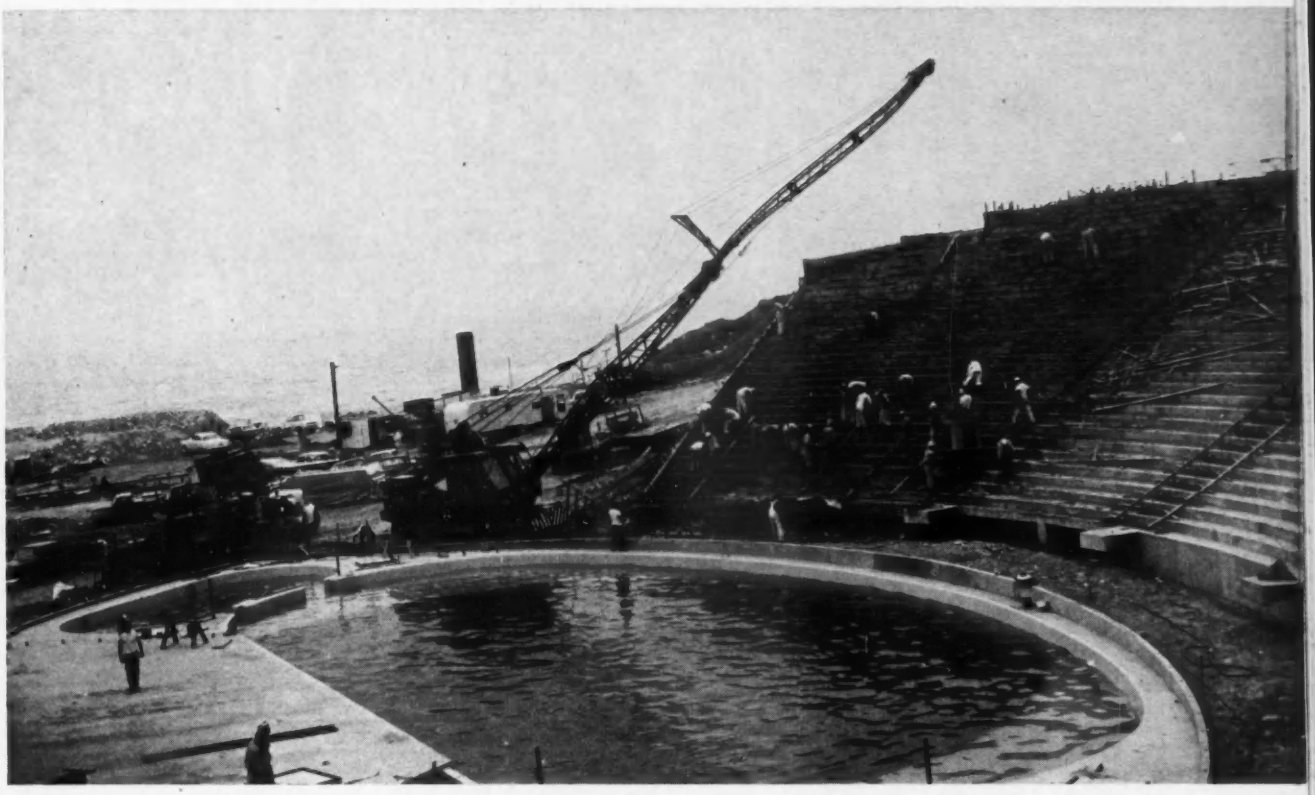
The Conference provides a continuing forum in which labor-management and industry problems (not the subject of existing machinery) can be regularly discussed and efforts made to reach constructive and equitable solutions. It is contemplated that mutually agreed upon methods should be devised to insure uninterrupted continuity of work on all projects and contracts. Any new machinery shall not affect the continued operation of the National Joint Board for the Settlement of Jurisdictional Disputes in the building and construction industry or any other existing machinery jointly established by the national unions and national contractor organizations.

The following types of subjects or problems will be considered:

(a) Present more effectively to private owners and government procurement agencies the advantages of the contract system.

(b) Consider the special problems and practices of particular localities where the pooled attention and assistance of national organizations of contractors and national unions may be used to improve conditions.

(c) Meet the need for a continuing and systematic study of a wide range of problems which confront the building and construction industry, in the promotion of the contract system.



With the completed pool in the foreground already in service, work progresses on the placement of concrete for the seating area. Site casting proved more economical than precast elements for the varying-length seat rows and the variety of transition contours.

SITE CASTING AND REMOVABLE SPREADER CUT COST OF ALL-CONCRETE MARINE STADIUM

A DECISION IN FAVOR of site casting, rather than using pre-cast components, combined with an ingenious removable spreader invented on the job, helped Paul W. Speer save time and money in his concrete work on the unique new $500,000 Sea Arena at Marineland of the Pacific, on Southern California's Palos Verdes Peninsula.

Designed by Los Angeles architects Pereira & Luckman, the 3,000 seat stadium of the new Sea Arena actually doubles capacity of the now world-famed Marineland, permitting as many as 25,000 visitors to view daily performances.

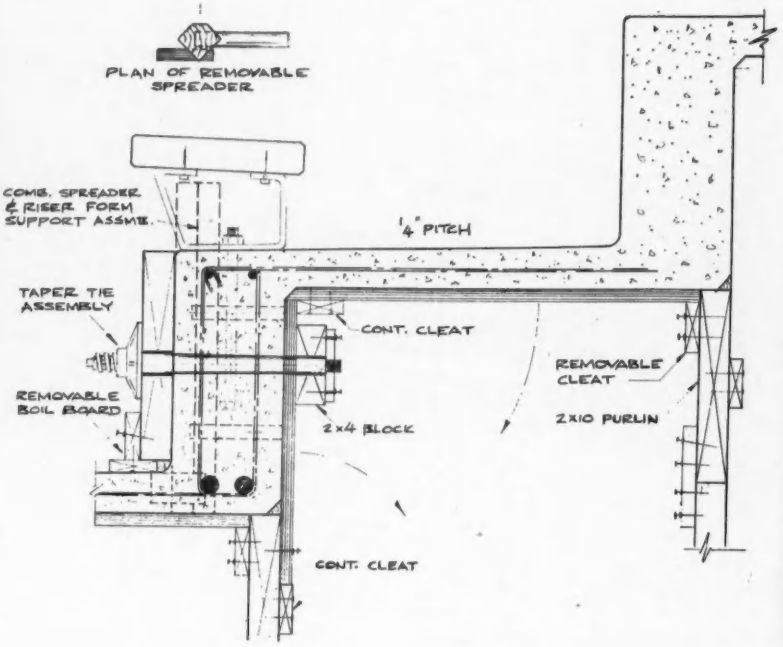
The all-concrete stadium looks down on a main pool, 15 feet deep and 120 feet across, flanked by smaller pools at each end which serve as holding tanks for the aquatic performers. A large open-air stage is equipped for a variety of theatrical presentations and beneath the stage large windows in the side of the pool provide ideal conditions for underwater photography.

"We expected the unforeseen even before starting the job," Speer explains, "and we didn't have long to wait inasmuch as unpredictable soil conditions, including massive beds of solid granite, slowed the site preparations. Excavations for bell caissons and shear walls to support the stadium, and earth removal for the huge pool area became a tortuous process.

"Dynamite was often the only solution," Speer continued, "and at times the excavation costs ran as high as $150 a yard."

The stadium, Speer pointed out, rests on 25 bell caissons and 4 shear walls, which go down as much as 15 feet to reach solid footings. The bells are 4 to 8 feet in diameter and the footings under the shear walls are 8 feet wide.

"Although serious consideration was



The photo above and the drawing at the right show how specially designed removable spreaders were used on this project.

given to using pre-cast components for the stadium," Speer said, "the final decision was for pouring in place, since the pie-slice shape of the structure demanded seat rows of varying lengths, plus a variety of transition contours.

"Results indicate that the decision was the correct one," Speer went on. "The forming and pouring operations proceeded very smoothly, compensating, in part, for the ruggedness of the earth removal work."

A major factor in the success of this particular phase of the construction, Speer points out, was the removable spreader invented by job superintendent Ken Damon, in order to maintain a constant 6-inch thickness along the poured vertical section directly beneath the bench seats.

Damon simply took an 18-inch length of two-by-two, with one corner beveled in order to reduce the width and provide for easier removal following the pour. A vertical support for the exterior riser form was secured to the bottom of the spreader and two dowels were fitted into holes drilled approximately 6 inches apart, parallel to the flat beveled surface.

Inserted between form and re-bar at 4-foot intervals, the spreader dowels butted at right angles against the inner plywood forms and maintained the desired beam width. After the pour the spreader was simply grasped at the top, given a one-quarter turn, and was easily withdrawn.

"In addition to being removable," Speer points out, "these spreaders were, of course, re-usable. Time was also saved in the extremely simple system of erecting and dismantling plywood forms, which could be quickly dropped away merely by the removal of one cleat.

"The rapidity of these operations," Speer said, "permitted these forms to be used many, many times during construction of the Sea Arena, cutting down considerably on the cost of lumber which would otherwise have been needed."

While workmen were pouring the final sections of the stadium, the other major part of the unusual project (the main pool) was already being put to use, with porpoises darting through the water, being trained to play basketball, retrieve rubber ducks and jump through hoops, apparently completely oblivious to all the nearby commotion as two cranes swung huge buckets of concrete overhead.

The 7-inch floor slab of the pool is poured concrete while the walls are gunite. Where the two meet, the joint was secured with a water-stop device. All of the pool concrete contains integral waterproofing. Thickness of the contoured wall varied according to the amount of water pressure it must contain. It reached a maximum thickness of 10 inches.

Use of the gunite, Speer said, offered obvious advantages in building up the walls of the pool. Forms were reduced to a minimum and the flexibility of the process permitted concrete to be quickly wrapped around steel tubing where required.

Gunite also provided the answer to one of Speer's unforeseen problems. Soil conditions, particularly a confusion of boulders and earth, left an untidy excavation. This condition was neatly corrected by using a lean mix gunite shaped fill prior to placing the pool's steel reinforcement. END

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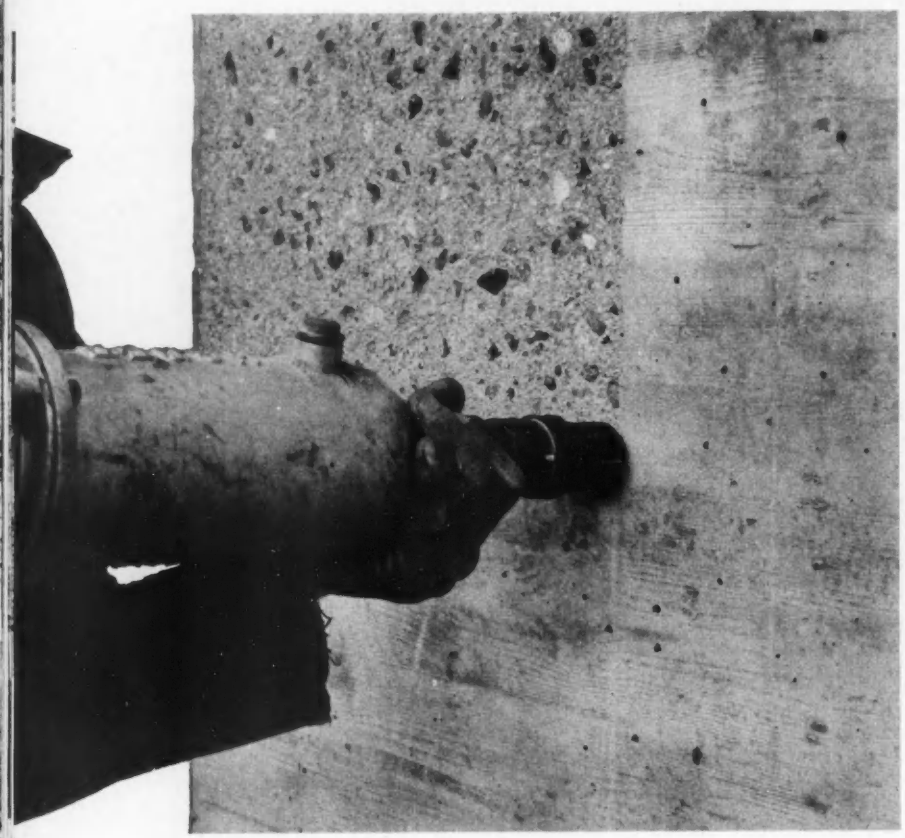

Fig. 1. Working a bush hammer over the concrete surface. Notice that the tool is held steadily at a right angle to the wall.

Patience, care and the development of a little skill in the use of simple tools can produce striking results when you try . . .

TOOLED FINISHES FOR CONCRETE

AS CONCRETE COMES to be recognized more and more as a versatile building material with structural possibilities that range far beyond its basic suitability for sidewalks, highways, dams and foundations—a new stress is being put on decorative finishes. Many startling and original methods have been worked out in recent years for obtaining such finishes.

Lining forms with ordinary heavy rubber matting that comes in a variety of design patterns is one method that has been tried. Another, perhaps remotely inspired by the irresistible urge people (both young and adult) seem to have to leave their lasting impression on fresh concrete, is the use of lightweight tools that imprint a design on the plastic surface.

The oldest technique, however, and probably the most commonly used is that of tooling, or chipping into the hard finished surface to get a new over-all effect. Although different tools produce different effects, the basic idea is to remove the smooth outer layer of hardened cement paste and thus reveal the rough-textured aggregates below.

Whether you do this by hand or with the aid of a power-operated tool would, of course, first of all depend on the amount of surface you wish to tool. Actually, hand tooling is only feasible for small areas or for areas close to an arris (i.e. the sharp edge formed by the meeting of two surfaces).

When you have decided in advance of a job that you want a tooled finish for the surface, there are certain precautions to be taken all along the way. The first is with the concrete mix itself. If you tell your ready mix supplier that you plan to remove the outer layer of hardened concrete, he will know that the mix has to be absolutely uniform throughout or the differences will show up at the tooling stage.

Several precautions should be taken at the forming stage; tooling, after all, means exposing whatever is below the top layer. This means formwork must be carefully constructed and watertight. Since joints will show, their location should be planned in such a way as to make them part of an architectural feature—*i.e.*, a projecting string course or a flat course of several rows of clay tiles.

Since tooling is never, under any circumstances, to be regarded as a technique for covering up poor concrete work, the concrete should be

carefully placed, evenly distributed to all corners of the formwork, and well compacted.

If reinforcing is being used in concrete that is to be given a tooled finish, it is important to give it a greater depth of cover to make sure it will be properly protected from exposure.

Tooling should not be tried until the concrete surface is thoroughly hardened. The ideal time for tooling concrete made with ordinary portland cement is four to five weeks after the job has been poured. Variations in this time element would depend on the maximum size of the aggregates used. Smaller aggregates (⅜ of an inch maximum) are more likely to be torn out than the larger sizes (¾ of an inch maximum).

Once you have started tooling, finish the entire job as soon as possible to get a consistent finish. After finishing, brush the surface well with a clean stiff broom to remove dust and loose aggregate particles. The last step is to hose the entire surface down.

There are two basic techniques for obtaining a tooled finish. One is known as bush hammering and results in a surface with an over-all rough texture that exposes the aggregates (see Fig. 1). The second is called point tooling, which gives the pitted effect you see in Fig. 2.

In bush hammering, the surface layer of concrete is spalled off with a toothed-head hammer (shown in Fig. 3). The hammer is held at right angles to the wall with one hand, while the other hand supports the bit to steady it (see Fig. 1). The hammer head should be rocked slightly as it is moved over the surface.

Since the hammer is quite heavy, it is advisable to work only a small area of the surface at a time. Care should be taken to keep the pressure as even as possible throughout and to see that the hammer does not produce any lined effects on the surface. The rocking motion is helpful in preventing any tendency to work in lines.

The cutting disc wears out after two or three square yards of concrete surface, and so should be replaced at frequent intervals. Since the texture alters with the condition of the disc, a new disc should never be worked right next to an area tooled with an old disc. Small irregularities in the finished surface can be worked out with further tooling. Bush hammering can be done by hand, but the mechanical hammer is preferred. (MORE)

Fig. 2. This enlarged photo gives you a good idea of the attractive rough-textured finish that can be obtained by point tooling.

Fig. 3. A close-up view of the toothed head of a bush hammer for decorating the hardened surface of concrete.

Fig. 4. Point tooling with a power-operated tool. It is best to work carefully and slowly, covering one small area at a time.

In point tooling, the concrete is pitted all over with either a power or hand-operated tool known as a point. The points should be made sufficiently close together to remove the entire outer layer of cement paste.

A power-operated point is held at right angles to the wall and pressed against the surface (see Fig. 4). The size of the pits will depend upon the pressure exerted on the tool and the length of time it is permitted to dig into the concrete.

A hand-operated point works in the same way. It is held at right angles to the wall and inserted into the concrete by a hammer blow.

Although there are other methods for producing tooled finishes on concrete, these two—bush hammering and point tooling—can be done by any careful workman on the job and do not require any special training or experience.

In tooling concrete, you should be aware of two situations that are to be avoided at all costs. If the concrete is made of soft aggregates, such as sandstone, either proceed with utmost caution or give up the idea of a tooled finish altogether. If the soft aggregates disintegrate under the blows of the tools, you will simply have a surface riddled with holes—with no particularly decorative effect gained.

The other situation to avoid is that of power tooling near arrises. The last inch or so near an arris should be done by hand, for the arris may be spalled off. You can either mark this danger point with a chalk line on the concrete surface or cast the face of arrises to be tooled as a projection, thus leaving the recessed margins to be left untreated or tooled by hand.

The technique for tooling is simple, requiring only patience and careful workmanship. The quality and attractiveness of the finished surface will depend entirely upon the degree to which you are willing to invest these two important requisites. END

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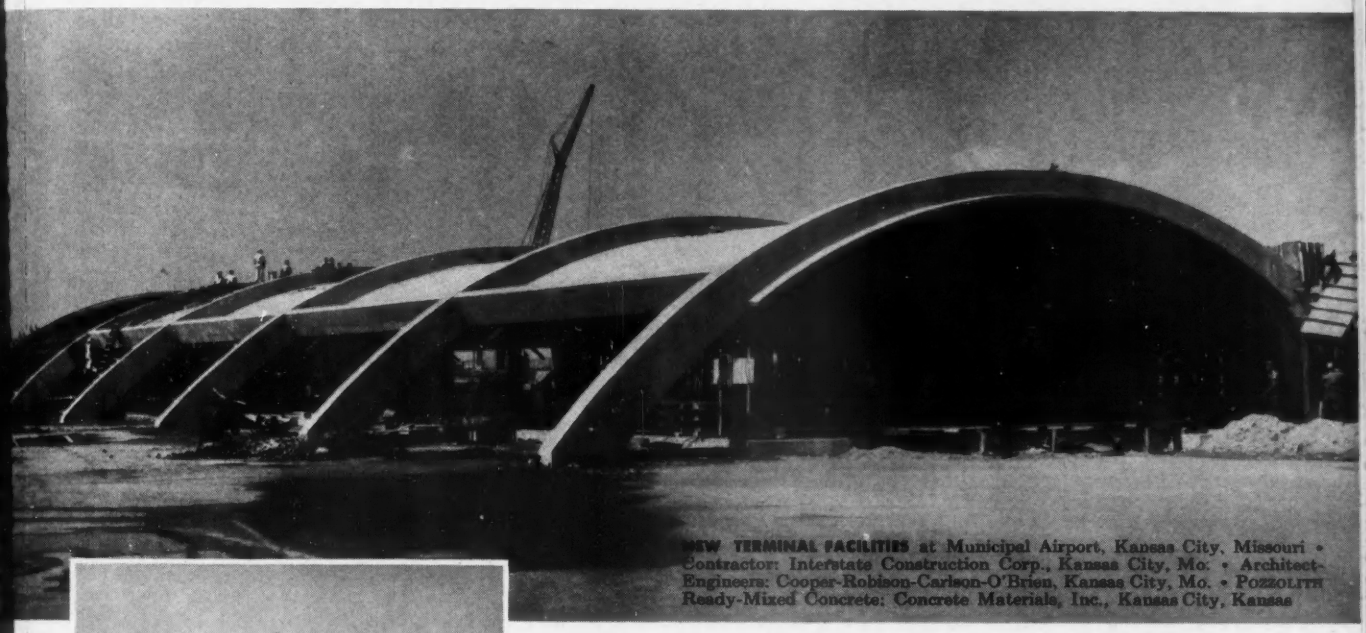
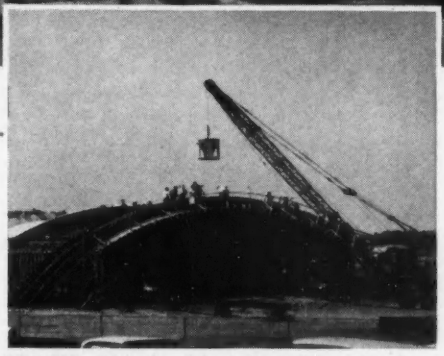
"This accelerated schedule saved us the cost of additional forms on the new Kansas City Air Terminal job"



NEW TERMINAL FACILITIES at Municipal Airport, Kansas City, Missouri • Contractor: Interstate Construction Corp., Kansas City, Mo. • Architect-Engineers: Cooper-Robison-Carlson-O'Brien, Kansas City, Mo. • POZZOLITH Ready-Mixed Concrete: Concrete Materials, Inc., Kansas City, Kansas



ROLLING FORM for thin-shell roof is stripped on third day. High early strength of POZZOLITH concrete allows accelerated production schedule . . . cuts contractor costs significantly.

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"To reach the required design strength in minimum time, the job called for extremely low-slump concrete . . . yet it had to be workable enough to consolidate around reinforcing steel in these 3-inch thin-shell sections. With POZZOLITH we got excellent workability, high early strength, and a superior finish with no honeycombing or cracks.

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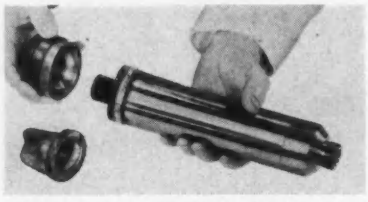

Tips screw on or off vibrator head easily, quickly...may be interchanged as required, replaced when worn.

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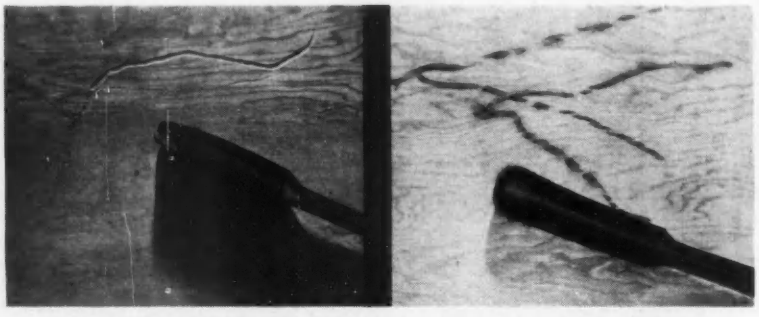

Steel tipped vibrator heads often cause deep gouges and scars on form faces (left), producing blemishes on exposed concrete surfaces and requiring expensive grinding and hand finishing. Rubber-tipped heads don't damage form faces any more than a rubber eraser (right), extend form life, produce smooth finish concrete, eliminate hand finishing.

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news

PCI announces short courses

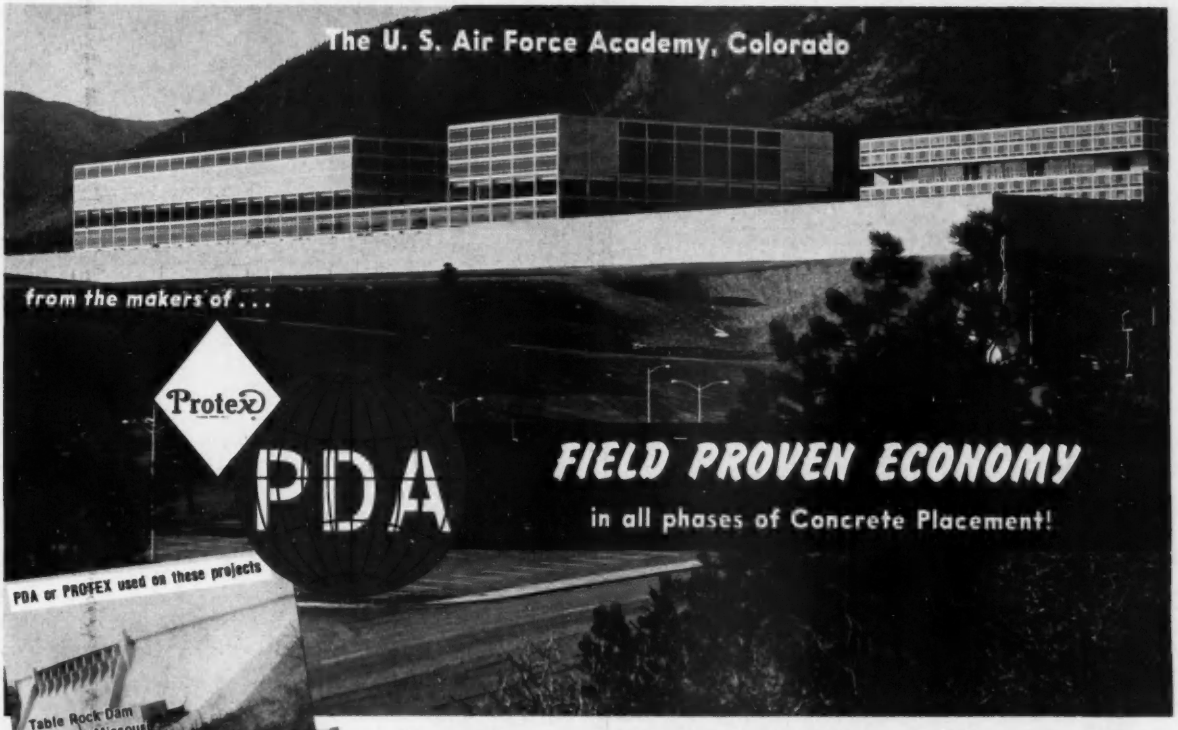
The first of a series of four short courses designed to acquaint engineers, architects and inspectors with the latest information on specifications and inspection of prestressed concrete, has been announced by the Prestressed Concrete Institute. The courses, each of which will include two days of classroom training and one day of field inspection, will be conducted by Jack Janney, consulting engineer of Glenview, Illinois, and Richard Elstner, structural engineer, PCA Laboratory, Skokie, Illinois. The courses will be sponsored by the Prestressed Concrete Institute as part of its expanding public educational service.

The first course will be held in Charlotte, North Carolina, May 5, 6, 7, 1959. Registration will be limited to assure small classes for most effective participation by those attending. Further information may be obtained by writing Peter J. Verna, Jr., president, PCI, P. O. Box 5247, Charlotte, North Carolina. Announcement of the time and place of the additional courses will be made at a later date.

slate ACI meeting for Mexico City

The 12th regional meeting of the American Concrete Institute will be held November 3-5, 1959, in Mexico City. The three-day program at the Continental Hilton Hotel and the Hotel Del Prado will feature concrete problems and techniques in Mexico and southwestern United States.

Tentative subjects for discussion on the technical program include the design and construction of concrete shell structures and the work techniques required to successfully build these structures; foundations for buildings with emphasis on the condition of compaction or subsidence; design of concrete structures to resist earthquakes; and materials with relation to aggregate, cement, and the proportioning of concrete mixes.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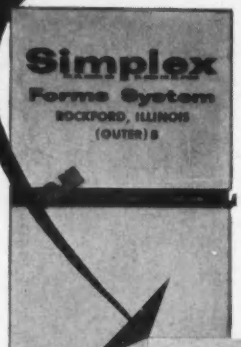

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books

English-Spanish Comprehensive Technical Dictionary—Section II. *By Lewis L. Sell. Published by McGraw-Hill Book Company, Inc., 327 West 41st Street, New York 36, N. Y. 1088 pp. $35.00.*

Over 400,000 of the latest technical terms and expressions in English and Spanish are contained in a new dictionary of translations from English to Spanish. The book covers such fields as atomic and nuclear engineering, industrial electronics, automation, analog and digital computers, data processing, business machines, microwaves, telecommunication, telegraph, telephone, facsimile, guided missiles, rocketry, artificial satellites, space travel, professional and color photography, color television, jet aircraft, radio, motion picture and television studio and station equipment, hi-fi, tape recorders, testing and measuring instruments, mining, radiation and scintillation counters, electroacoustics, radio chemicals, plastics, textiles, and radar.

The dictionary points out which Spanish language equivalents are proper for any particular Latin American country, and also indicates which English terms are most acceptable in the U. S. A., which in Britain. There are complete definitions, synonym and antonym lists, and the book is completely cross-referenced.

The new volume also forms an updating supplement to the 1944 edition and includes terminology developed during the last 15 years.

Frames and Arches: Condensed Solutions for Structural Analysis. *By Valerian Leontovich. Published by McGraw-Hill Book Company, Inc., 327 West 41st Street, New York 36, N.Y. 494 pp. Illus. $20.00.*

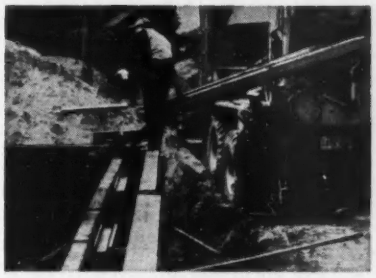
Over 400 condensed solutions for twenty principal types of statically indeterminate frames and arches are given in this newly published book. Each condensed solution applies to a particular structure and a load. The solutions allow almost limitless variation in members' shape or cross section, and can be used in steel, concrete,

Concrete basements stay dry when builders follow these rules

It's easier to build a dry basement than to repair a leaky one afterward. Here is how to build leak-proof, cast-in-place walls to make a dry concrete basement.

Place footings on firm soil below the frost line, following building code requirements. If no code applies, make the footing as thick as the wall and twice as wide.

Use sound forms, well braced, for walls that are true to line and grade. If re-using forms, be sure panels are carefully cleaned, then oiled, soaped or lacquered on inside surfaces.



Use a quality concrete mix, placed in 12-inch, even layers. Spade or vibrate to settle concrete. To prevent segregation in ready-mix, deliver at enough points to avoid long chuting distances.

Strip forms after concrete hardens. One or two days is usually long enough in summer—four to seven days in cold weather. Pull out or break off tie rods, patch holes with mortar.

What about condensation?

Often builders are blamed for leaky basements when the trouble is condensation. Avoid this by explaining that condensation can be controlled by ventilation, covering cold water pipes or installing a dehumidifying unit.

Paint all exterior walls with class "B" portland cement paint or two coats of hot bituminous material. To smooth interior surfaces, rub with carborundum stone and cement-water mix.

Place drain tile around the outside of the footing, except in dry climates or in extremely well-drained soils. Cover the tile with a 12-inch layer of coarse aggregate.

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Richmond ½" and ¾" screed bases now available in alternate Free-Fit Type for adjustment without turning cradle head.

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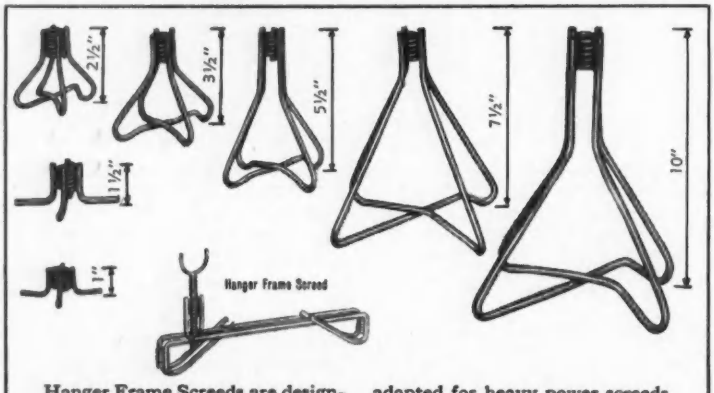
This type of unit is especially handy for use on structural steel beams of bridge decks where it is desireable to tack-weld the screed base to the steel. Adjustment is readily possible with the free-fit assembly.



Hanger Frame Screeds are designed to do a two-fold job of hanging forms and supporting screed rails. Richmond has a wide range of adjustable screed base sizes. They can be used for hand screeds, vibratory screeds and have been adapted for heavy power screeds. Spans up to 36 feet have been screeded with these devices. Whatever the type or size, all Richmond screeding devices provide the extra strength that saves money and assures a better job.

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books

and wood design. Also included are comprehensive tables and charts to facilitate the analysis of haunched frames and arches.

Only simple algebraic equations are required in order to use this book. The results constitute the numerical values of the redundants, and once the redundants are determined the moments and forces may be obtained quickly for any section of a structure.

An explanation of principal notations, coordinates, and the sign convention for moments and forces is given with the solution of every frame or arch. The definition and meaning of all terms used in the book are comprehensively reviewed. Illustrative problems help the reader understand all details of analysis and gain familiarity with the tables and charts as sources of speedy aid in the solution of problems.

Elements of Reinforced Concrete. *By Sylvan P. Stern. Published by Prentice-Hall, Inc., Englewood Cliffs, N. J. 448 pp. Illus. $8.25.*

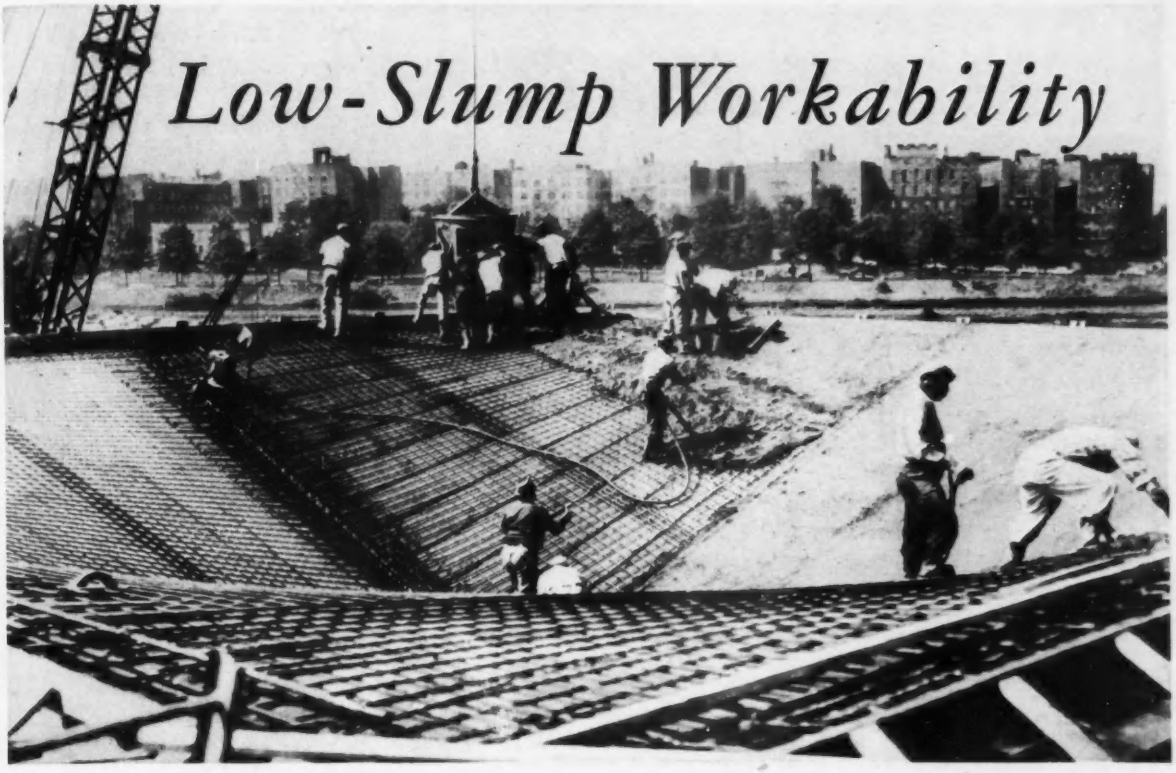
The author brings twenty years of teaching and in-the-field experience to this new text.

Introductory and review material are thoroughly covered and then elastic and plastic elements are developed. Applications are then made through the design for the foundations of a steel framed building in accordance with the Building Code Requirements for Reinforced Concrete ACI 318-56 (The American Concrete Institute Building Code) and the use of the ASTM A305 type deformed concrete reinforcing bars.

After the design portion of the project is completed, the foundations designed are completely detailed on a set of working drawings where the concrete lines are shown, quantities of material estimated, the reinforcement identified, and bar bending schedules and a complete bill of material prepared.

Schematic and structural design drawings clarify each discussion and problems aimed at developing complete understanding of principles conclude each chapter.

Low-Slump Workability



This hyperbolic paraboloid, spanning 60 feet, is one of six for the new library of Hunter College, New York City.

...with PLASTIMENT

Architect:
MARCEL BREUER, FAIA
Consultant: Eduardo Catalano
Associate: Robert F. Gatje
Consulting Structural Engineers:
FELIX CANDELLA; FARKAS & BARRON
General Contractor:
LEON D. DeMATTEIS & SONS, INC.
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DIC CONCRETE CORP.

The problem, to place lightweight Lelite concrete on steep slopes — as much as 45° — for the 3½ in. thick hyperbolic paraboloid roof of the new Hunter College library . . . Good workability at low slumps and a cohesive mix were vital . . . Plastiment retarding densifier, added to the mix, gave the desired workability at 2-inch slumps, and rapid clear-water bleeding for stability on steep slopes, resulting in sound concrete . . . Strengths of 3000 psi were obtained in 7 days.

Plastiment controls the hydration of cement by retarding and reducing cement gel formation . . . It does not entrain air so that proportions can be varied to meet job conditions . . . Workability is greatly increased so that even stiff mixes are readily compacted . . . In addition, it reduces cracking, increases strength and provides more uniformity in a concrete member.

Call Sika direct or nearest distributor for catalog and technical information and service.

Other Sika Admixtures:

SIKACRETE	SIKA AER	INTRAPLAST	SIKA NO. 1
Accelerating Densifier	Air Entraining Resin Solution	Expanding Grouting Aid	Integral for Cement Mortar

RELIABILITY
•
EXPERIENCE
•
SERVICE

SIKA CHEMICAL CORPORATION
PASSAIC • NEW JERSEY
COMPOUNDS FOR MASONRY and CONCRETE CONSTRUCTION

THE '59 LINE OF Kelley

CONTRACTORS' EQUIPMENT

- UP-TO-DATE DESIGNS
- CAREFULLY ENGINEERED AND FULLY TESTED
- BUILT FOR ROUGH USE
- SPEEDS UP WORK... SAVES MONEY

POWER TAMPERS

Self-propelled . . . delivering 2400 impacts a minute. Two models: 18" wide shoe, and 36" wide shoe. For packing down earth backfill to maximum density next to foundations, on road-widening jobs, etc. Also for finishing blacktop . . . with heater shoe attachment available.

POWER TROWELS

Six models to choose from . . . 2 de-luxe Hydra-Trowels, 34" and 44" sizes, with fingertip blade control . . . and 4 super models with manually-adjusted blade pitch: 24" Kelley Bantam, 29" Kelley Boy, the popular 34" Kelley Chief and the big 44" Kelley Commander . . . a size for every job.

POWER BUGGIES

Positively tops for fast and dependable handling of concrete and other materials. Hydraulic mechanism dumps or spreads loads up to 10 cu. ft. and there's full power in *both* front wheels for extra traction. Safety step and guards protect operator.

SPACE HEATERS

What a blast! From the Kelley Hot Shot Space Heaters, one delivering 120,000 Btu/Hr and the other delivering 320,000 Btu/Hr. Let 'er blow outside . . . work goes on inside with Kelley Hot Shots! For work around walls, floors, scaffolds and hundreds of other construction jobs.

COMPACTORS

The new Kelley Compactor with "Compaction Control" . . . easier operating, faster, more powerful. For compaction-floating all types of concrete floors, for keying in surface hardeners, and for bonding dry-tamp floor topping to a concrete slab. Grinding attachments available.

Kelley MACHINE DIVISION
The Wiesner-Rapp Co., Inc.
285 Hinman Avenue
Buffalo 23, N. Y.

Please send us information on Kelley products.

NAME _____

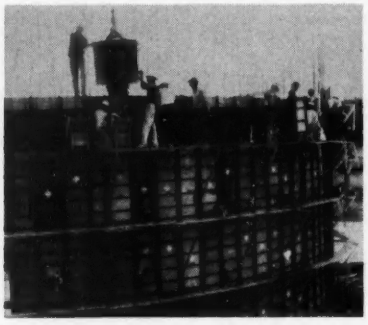
STREET _____

CITY _____ ZONE _____ STATE _____

equipment and tools

circular walls

Not only Y walls but circular walls were specified in an Ohio sewage treatment plant. Three problems were involved: economic bracing, placing of concrete, and proper vibrating. The project consists of 56,000 square feet of forming for four digestors each 80 feet in diameter, 28 feet in height and 8 inches thick with no horizontal joints. The problem was solved by using Symons steel-ply forms ganged and braced with steel trusses on the



inside of the tanks and erecting forms on the outside of the walls as they were poured. The day before pouring a tank one tier of 6-foot forms was erected on the outside and every other form in the second tier was put in place. If time permitted, every other vertical row of forms was erected to the top of the wall. Ties were placed in the ganged form from permanent scaffolds. In order to overcome placement and vibrating problems the rest of the forms were erected as pouring progressed. By using 6-foot Symons forms on the first horizontal row and 4-foot flexible fillers, it was possible to lap them all the way to the top which made erecting faster. The 2,400 square feet on the outside of the tank was erected by four carpenters and four laborers as concrete was poured. Pouring was done from a lay-down bucket at the rate of about four feet every hour. Symons Clamp & Manufacturing Company, 4249 West Diversey Avenue, Chicago 39, Ill.

You Get a Batch of Extra Benefits with Permalite®

Lightweight Insulating Concrete

GREATER STRENGTH than any other concrete in the same weight class—compressive strengths of 480 psi or more with a 1:4 mix.

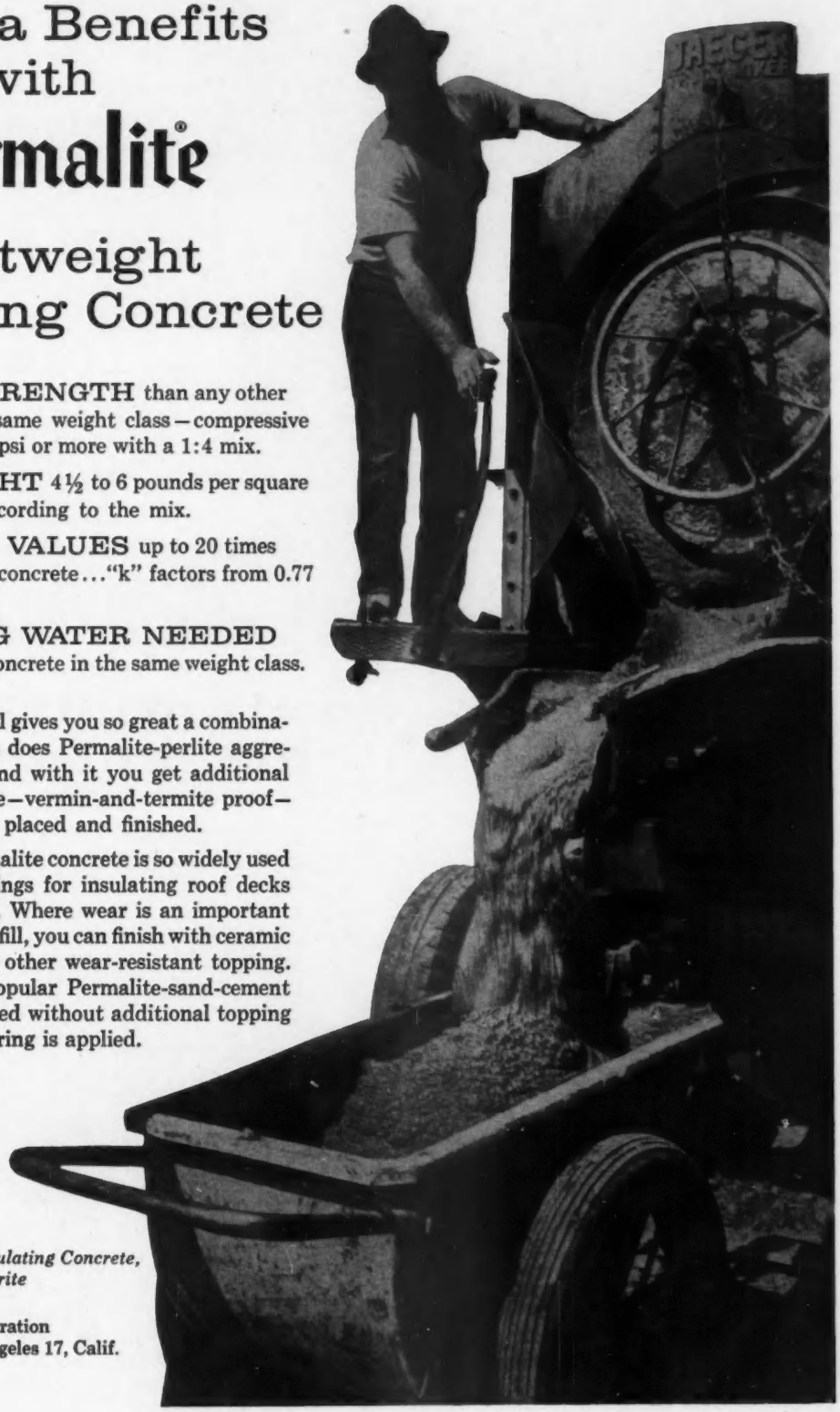
LIGHT WEIGHT 4½ to 6 pounds per square foot 2" thick according to the mix.

INSULATING VALUES up to 20 times that of ordinary concrete..."k" factors from 0.77 to 0.58.

LESS MIXING WATER NEEDED than any other concrete in the same weight class.

No other material gives you so great a combination of values as does Permalite-perlite aggregate concrete. And with it you get additional benefits—fire-safe—vermin-and-termite proof—can't rot—easily placed and finished.

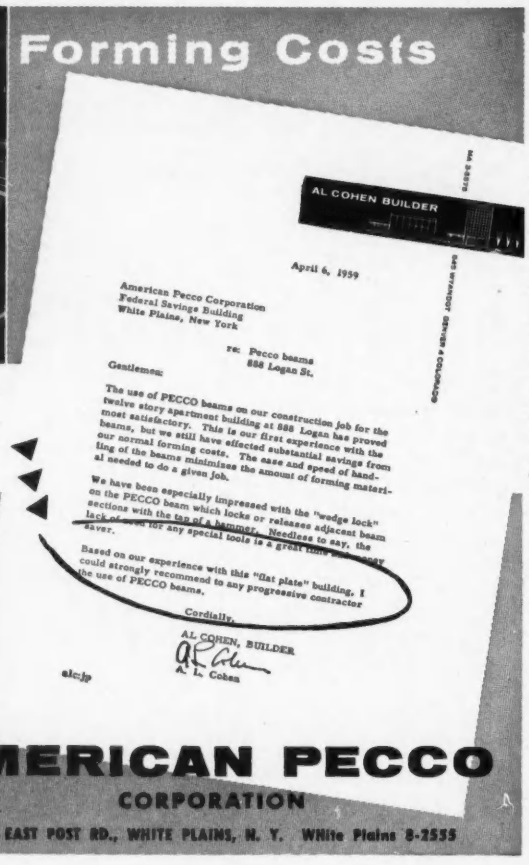
That's why Permalite concrete is so widely used in today's buildings for insulating roof decks and for floor fill. Where wear is an important factor, as in floor fill, you can finish with ceramic tile, terrazzo, or other wear-resistant topping. Or one of the popular Permalite-sand-cement mixes may be used without additional topping before floor covering is applied.



For the complete story on Permalite Lightweight Insulating Concrete, see your Sweet's File, or write

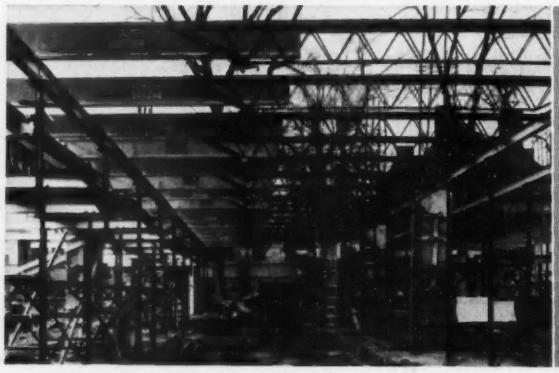
Perlite Department,
Great Lakes Carbon Corporation
612 So. Flower St., Los Angeles 17, Calif.

Pecco Way Saves on Forming Costs


AL COHEN BUILDER
April 6, 1959
American Pecco Corporation
Federal Savings Building
White Plains, New York
re: Pecco beams
888 Logan St.
Gentlemen:
The use of PECCO beams on our construction job for the twelve story apartment building at 888 Logan has proved most satisfactory. This is our first experience with the beams, but we still have effected substantial savings from our normal forming costs. The ease and speed of handling of the beams minimizes the amount of forming material needed to do a given job.
We have been especially impressed with the "wedge lock" on the PECCO beam which locks or releases adjacent beam sections with the top of a hammer. Needless to say, the lack of [illegible] for any special tools is a great [illegible] saver.
Based on our experience with this "flat plate" building, I could strongly recommend to any progressive contractor the use of PECCO beams.
Cordially,
AL COHEN, BUILDER
A. L. Cohen
alc:jp
AMERICAN PECCO
CORPORATION
188 EAST POST RD., WHITE PLAINS, N. Y. White Plains 8-2535

We let the third paragraph of Mr. Cohen's letter speak for itself . . .

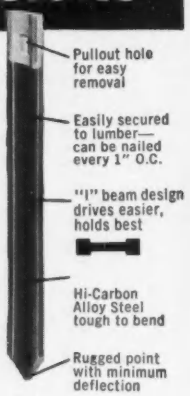
"Based on our experience with this "flat plate" building, I could strongly recommend to any progressive contractor the use of PECCO beams."



SYMONS Steel Stake

Can Be Reused Indefinitely

Drives easily into hard earth. Can be used for practically any type of stake work. This popular item is available in 12", 18", 24", 30", 36" and 42" sizes.


Pullout hole for easy removal
Easily secured to lumber—can be nailed every 1" O.C.
"I" beam design drives easier, holds best
Hi-Carbon Alloy Steel tough to bend
Rugged point with minimum deflection

Symons

SYMONS CLAMP & MFG. CO.
4271 Diversey Ave., Chicago 39, Ill., Dept. F-9

We will send contractors a sample 12", 18" or 24" stake if request is received on company letterhead. Please include 50c for 12", 75c for 18", $1.00 for 24" to cover cost of postage and mailing.

Name_____

Firm_____

Address_____

City_____ Zone____ State_____

equipment tools and materials

steel structurals

Junior Beams, lightweight steel structural members, are being used as construction joints in concrete warehouse floors. The top flange of the beam, by permitting almost an inch of contraction before the concrete edges are exposed, are said to substantially reduce crumbling and splitting caused by constant pounding from the wheels of fork lifts and other materials handling equipment. The beams also serve as built-in screeds and bulkheads, and eliminate the temporary wooden setups required for bays. Jones & Laughlin Steel Corporation, 3 Gateway Center, Pittsburgh 30, Pa.

SYMONS FORMS *can help your firm*

save on labor and material costs . . . save time . . . do a better job

Symons different type forms are not confined to a single type of application. They can be used on most any type construction job and on any height wall. Factory-made from the finest of materials. Frames of the Steel-Ply and Mag-Ply Forms have an indefinite life.

Wood-Ply

Symons manufactures three types of wood forms. *High Strength Panels* . . . recommended for pouring concrete walls with pressures up to 1,200 pounds per square foot; *"Champ"* Panels . . . for both commercial and residential work; *Light Construction Panels* . . . for light or residential construction, where heavy pressure is not a factor.

Symons High Strength Panel has steel cross members on 12" centers. Its weight averages just 5 pounds per square foot.

Wide Panel

Symons Wide Panel Forms have steel struts and 2x4 cross members to strengthen the panel and minimize deflection when subjected to heavy pressure. These forms are used in gang forming. They have tie holes in the steel struts which allow the insertion and removal of special ties when the panels are ganged. Built in 6′ and 8′ lengths and 30″, 36″, 42″ and 48″ widths.

Pouring a 2,400 foot retaining wall with Symons Wide Panel Forms made up in gang sections of 10′x24′ and 15′x24′.

Steel-Ply

Designed for durability and long-life. The initial cost of these forms is higher than Symons Wood-Ply Forms. However, this first cost is more than offset by the many reuses possible with these panels. They are easily erected and stripped with the 3 basic pieces of the Symons System—connecting bolt, panel tie and wedge.

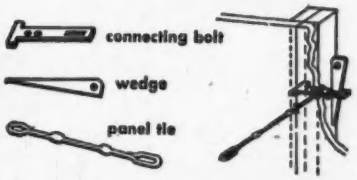
37,000 square feet of Steel-Ply Forms used on the Air Force Academy, Colorado Springs, Colorado.

Mag-Ply

Symons Mag-Ply Forms are the lightest forms available . . . weight averages about 3½ pounds per square foot. The frames of durable, rust-proof magnesium completely encase the plywood, will last indefinitely and will not swell or shrink. 2½″ thickness of frames means more panels per truck load, less space for stacking and storage.

Light and efficient Mag-Ply Forms are readily adaptable for circular, battered and cut-up walls.

Only 3 Hardware Pieces



Symons Forms available on a Rental Basis. Rentals can apply to purchase price.

Symons CLAMP & MFG. CO.

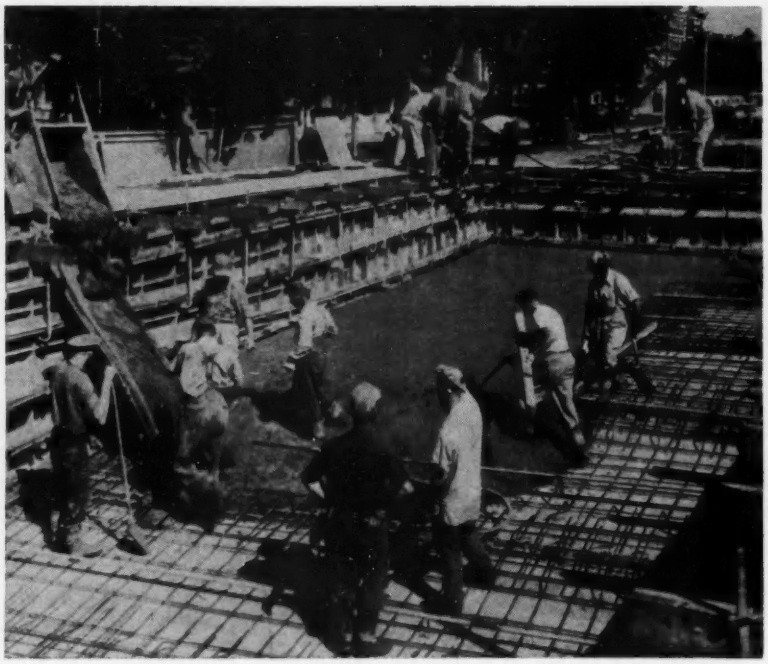
4271 Diversey Avenue • Dept. F-9 • Chicago 39, Illinois

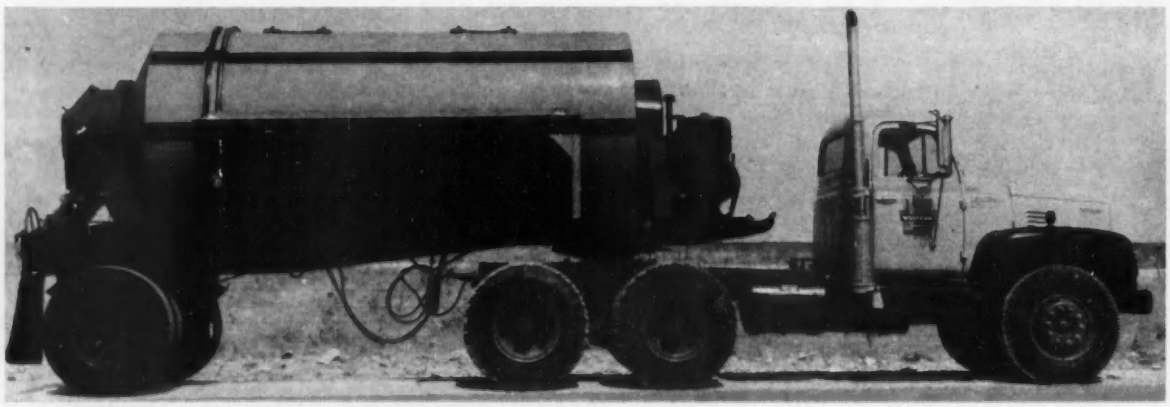
Warehouses in California, Kansas, Minnesota and New Jersey • Sales Offices and agents in principal cities

more SAVINGS from SYMONS

retardant

Placing 250 cubic yards of ½-inch slump concrete for a monolithically cast concrete swimming pool in Canada proved easy, although the contractor was somewhat apprehensive when the concrete appeared to be standing almost straight up as it was being chuted out of the ready mix truck. However, it is reported that because of the addition of Plastiment the concrete was easily worked into place when vibrated, making possible concreting of the 25- by 75-foot pool in seven hours without honeycombing. Ordinary concrete with this low slump would have been very difficult to work, and would have resulted in honeycombing and in the formation of cold joints between the floor and walls, and possibly between truckloads of ready mix. Also, the ability to join concrete to material placed four hours earlier, in 85 degree F. summer temperatures, would have been impossible without the addition of a retarder. Sika Chemical Corporation, Passaic, N. J.





NOW AVAILABLE: Six mechanically-perfect cement or sand transport semi-trailers

SPECIFICATIONS:

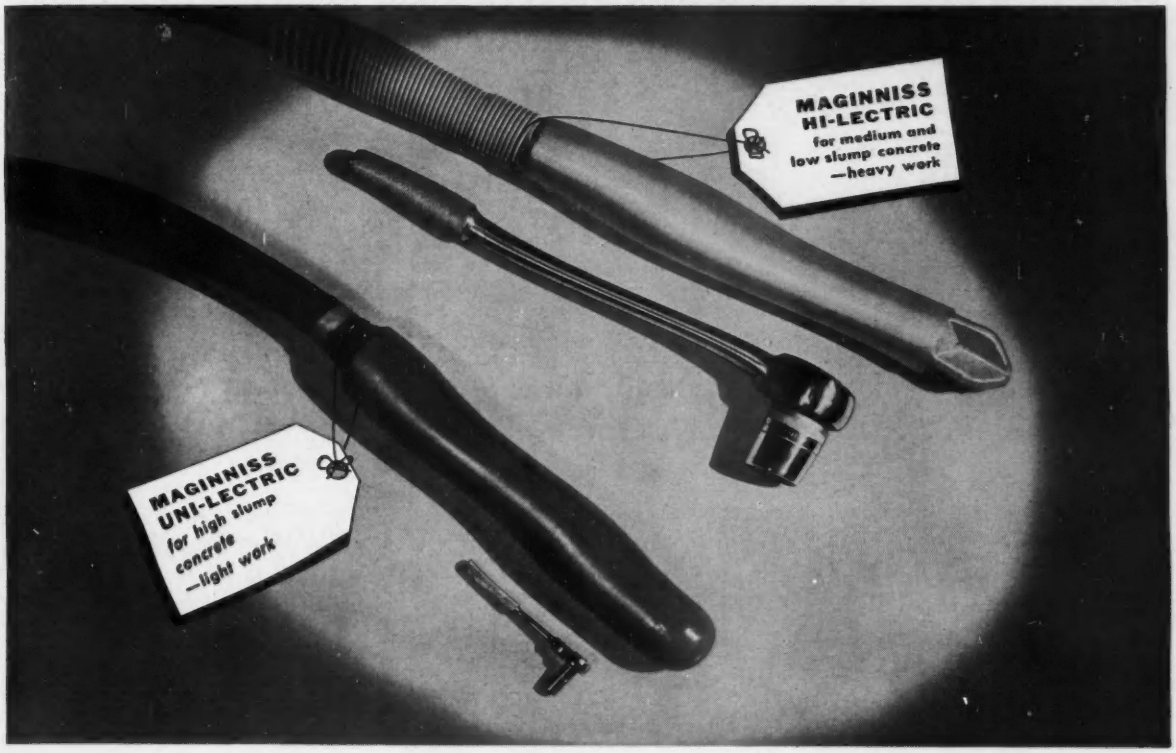
CHASSIS:	Single-axle, Semi-Trailer, Fruehauf Model U O 55SA w/3¼" x 4⅝" Beam-Type Axle Equipped w/16" x 6½" straight air brakes.
TANK:	Rotary Type, Rear Delivery, 30,000# capacity.
ENGINE:	I H C U-164 Industrial Power Unit w/6-volt Starter and Generator and 8" Twin Disc Power Takeoff Clutch.
TRANSMISSION:	Cotta JR 500-23, 1-1 Ratio Forward and Reverse 10.6 Hydrosheave 1-15/16" Bore.
POWER REDUCER:	Eberhard-Denver #60R40 Series 400, w/2¾" Output Shaft.
TIRES:	10:00 x 20 Dual Nylon Highway Type.

These trailers are ideal for hauling and dispensing cement slurry, sand and gravel. Have been used only for sand, and are in top mechanical condition.

They are surplus equipment for us, but could supply you with years of efficient transport. For price quotation call or write:

MARION BELKNAP
The Western Company
Box 310, Midland, Texas
MUtual 3-2781

Maginniss motor-in-head concrete vibrators—best for every job!



Use the right tool...

Skilled mechanics are careful to use the tool best suited for the job at hand. Profit-conscious contractors, too, use equal care when selecting concrete vibrating equipment.

And, because Maginniss builds both Hi-lectric induction motor-in-head vibrators for heavy work and Uni-lectric series motor-in-head vibrators for light work, you can choose the vibrating tool best suited for your construction jobs—large or small!

For better concrete . . . higher production . . . lower costs, see your Maginniss distributor. He'll recommend the Maginniss motor-in-head vibrator exactly right for your needs.

A.A.-4019

HI-LECTRIC vibrators, featuring powerful induction motor-in-head design, are ideal for continuous use in heaviest service. Use them on bridges, culverts, heavy structures of all types and on paving jobs.

UNI-LECTRIC series motor-in-head vibrators use available 110 volt current. For sound, better looking concrete, use them on footers, curbs and gutters, thin walls, drives, floors, repairs—any light job.

listed under "Contractors Equipt" in 85 principal cities

Find your nearest distributor in the 'Yellow Pages'

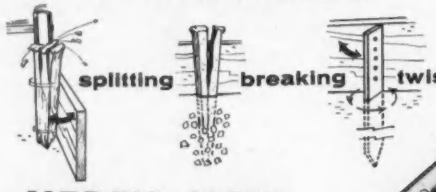
Maginniss HI-LECTRIC POWER TOOLS

MAGINNISS Power Tool Company

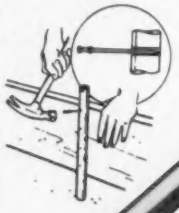
Dept. CC-69, 154 Distl Avenue, Mansfield, Ohio

STEEL STAKES by dee

STOP this WASTE



HERE'S HOW



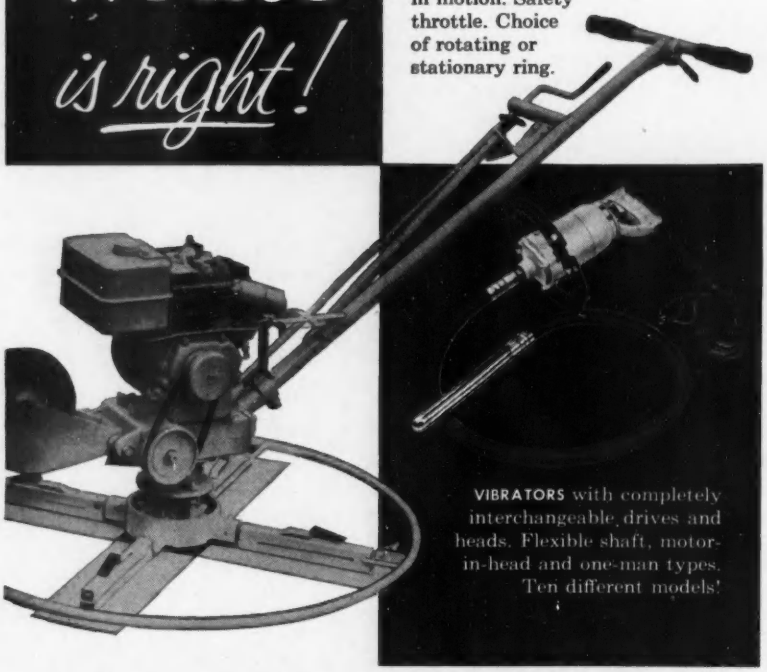
100 or more uses
Set up 10 times faster
Strip 20 times faster

HOLDS SOLIDLY
DRIVES RAPIDLY . . .
regardless of rotation or subgrade

dee Concrete Accessories Co.
Phone: MOhawk 4-3664
670 N. Michigan Ave., Chicago 11, ILL.

White *is right!*

FIVE DIFFERENT TROWELER MODELS!
Pitch adjustment in motion. Safety throttle. Choice of rotating or stationary ring.



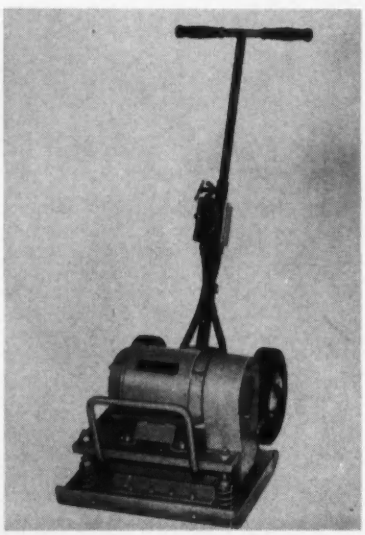
VIBRATORS with completely interchangeable drives and heads. Flexible shaft, motor-in-head and one-man types. Ten different models!

FOR FREE LITERATURE WRITE WHITE MFG. CO., DEPT. 14, ELKHART, INDIANA

equipment and tools

vibratory compactor

An electric motor drive, available for the Maginniss vibratory compactor, is desirable when doing soil or blacktop compaction in or around buildings. By substituting a reversing switch for the standard dust-tight on-off switch mounted on the handle, the Powr-Pactor will walk in either direction. The manufacturer states that the unit has a fixed vibrating frequency of 6,500 vpm and a compacting force of 4,000 pounds. It will travel up to 50 feet per minute. Damping springs isolate the 12- by 18-inch compacting plate from the rest of the machine. Two dolly wheels facilitate moving it into



place and out of corners. A water feed attachment and wide rim steel rollers in place of the dolly wheels are available for hot-mix asphalt applications. Compaction of stone, gravel and granular soils under floor slabs, in trenches, on bridge approaches, around foundations, footings, abutments, pipe lines and the compaction of blacktop on highway and street repairs, around manholes, driveways, walks and parking lots are listed among its many uses. Two or more units can be ganged side by side for compacting larger areas, or in tandem for trench work. Maginniss Power Tool Company, 154 Distl Avenue, Mansfield, Ohio

tools and materials

concrete vibrator

A vibrator which produces 9000 vibrations per minute in concrete is mounted on a wheelbarrow carrying frame which pivots with the engine to prevent interference with the shaft. Vibrator heads are available in two sizes and are lifetime lubricated and sealed against moisture and dirt. The reversible flexible cable, made in four shaft lengths, has a plug-in design for attaching the engine, vibrator head or coupling. Write Empire Corporation, 1566 South 83rd Street, Milwaukee 14, Wisc.

portable space heaters

Design features of three models of oil-fired space heaters for the building trades include a precision engineered and screened burner nozzle which burns the fuel completely to lessen danger of fumes, a preset burner head which requires no adjustments, burner electrodes and nozzle which are easily removed for cleaning, and a large fuel tank which insures a continuous flow of heat for 16 hours. Write Muller Machinery Company, Inc., Metuchen, N. J.

mobile radio

This new two-way radio equipment contains transistor power for both transmitter and receiver. Units are available either for mounting in the front of a car or truck, as shown, or for placement in a vehicle's trunk. General Electric transistor-powered designs may be used in low or high band frequencies or UHF. General Electric, Communication Products Department, Electronics Park, Syracuse, N. Y.

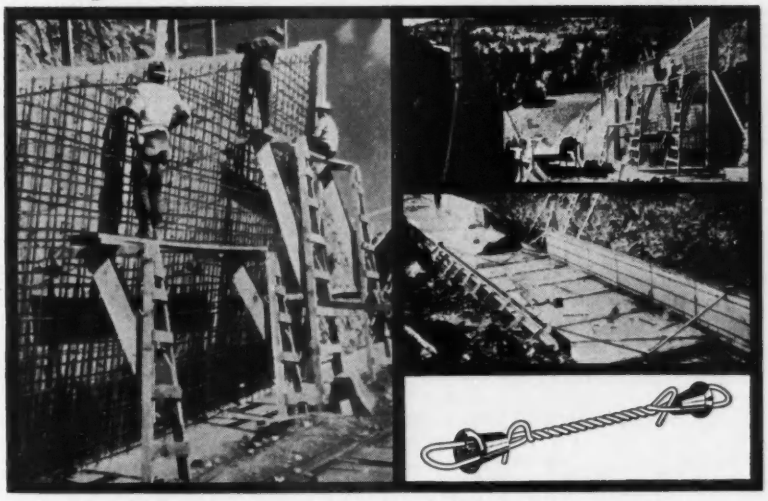
floor surfacing compound

A floor surfacing and patching compound consists of epoxy resin plastic, a hardening agent, and kiln-dried sand. When blended, the mixture bonds permanently to old or new concrete, wood or metal floors, forming a firm, smooth surface that provides excellent resistance to heavy impact, abrasion, chemical action, and scrubbing with strong alkali soaps and detergents. It is suitable for both interior and exterior use, and is valuable where maintenance is a problem or where skid-resistant surfaces are desirable. Write Howe & French, Inc., Weymouth, Mass.

repair material

Cracks and shallow holes in concrete floors can now be repaired without stopping traffic or production. The workman simply trowels or tamps Jiffy Floor into the cracks and lets the traffic roll it to a paper-thin feather edge. No cutting, chipping, mixing or drying is required. The material may be used either indoors or outdoors, and according the manufacturer will last for years without cracking, crumbling or curling. Write The Monroe Company, Inc., 10708 Quebec Avenue, Cleveland 6, Ohio.

Dam Spillway Walls Battered And Tapered With Forms Set At An Angle



Recreational dam and spillway for Colorado State Game and Fish Department, Pagosa Springs, Colorado
Contractor: Hopkins Construction Company, Denver

PROBLEM: Specifications required that the main sidewalls of the spillway taper from 20'0" to 4'0" in height, within a distance of several hundred feet. As the height diminished, the thickness of these battered walls reduced at the bottom from 18" to 8". Wall thickness at the top was 8" throughout.

SOLUTION: Working with the contractor, Gates engineers adapted the standard Gates Commercial Forming System so that both panels and form ties were run parallel to the top of the wall and cut at an angle to the footing.

Special forms were designed for the inlet and stilling basins, while the main run of the spillway was formed with Gates Horizontal Rod System with no special adaptations necessary. The new PlastiCone* ties with a 1-inch break-back were used exclusively.

RESULTS: The forms were erected quickly and economically and the quality of the finished concrete was excellent.

Why not let us show you how Gates *thin-panel* Forming can help you profitably solve your next forming problem.

*TRADEMARK

USE GATES IT'S GALVANIZED

Gates & Sons, Inc.

80 So. Galapago Street Denver 23, Colorado

Branches in Spokane, Rochester and Lethbridge

SEE OUR CATALOG IN SWEET'S ARCHITECTURAL FILE OR WRITE FOR COPY

CCM:6/59

HOW TO RUB or GRIND CONCRETE

Today, more and more builders specify a fine finish for concrete walls and ceilings. Because of this new requirement, and of the time and expense involved for hand finishing large areas, Stow Manufacturing Company has developed two easily portable flexible shaft grinders for finishing concrete. These grinders are electrically powered.

Two methods are used to smooth off hardened concrete: wet rubbing and dry grinding. Wet Rubbing—required for smoothing green concrete to a plaster-like finish. Use slow speed grinding wheel or disc. Apply water while grinding. Wet concrete can also be painted on with a brush, then smoothed into holes with the grinding wheel. Dry Grinding—use a high speed grinding wheel or abrasive disc to smooth dry concrete.

Either of Stow's portable, electric grinders, the ½ HP model G40-C or the ¾ HP model JT-50, can be used for wet or dry grinding. Both models are available with open or totally enclosed motors, and are equipped with 8 or 12-ft. flexible shafts. Angle heads with different speed ratios can be selected. Write for STOW's pamphlet, Grinding Concrete, for complete information on proper speeds, grinding discs and wheels for both wet and dry concrete finishing. Stow Manufacturing Co., Binghamton, N.Y. also makes a complete line of concrete vibrators, rotary trowels, and screeds.

STOW MANUFACTURING CO., Dept. A-1
354 Shear St., Binghamton, N. Y.

Please send me your pamphlet, GRINDING CONCRETE.

Name.....Title.....

Company.....

City.....Zone....State.....

literature

Nine ways to better concrete. A 6-page Master Builders Bulletin, P-36B, contains a concise analysis of the nine vital factors governing the production of high quality concrete. Charts, graphs and photos based on field and laboratory tests show how the use of Pozzolith will give concrete increased flexural, bond and compressive strength, effectively entrained air, increased workability and durability, reduced shrinkage and permeability, and initial retardation and resistance to scaling. The Master Builders Company, Cleveland 3, Ohio.

Testing apparatus. A new products bulletin is now available which describes ten recently developed items which have been added to the line of testing apparatus manufactured by Soiltest, Inc. Included in the list of items are apparatus for concrete, soils and asphalt testing, as well as the Soiltest Beggs Deformeter for solving problems involved in the design of indeterminate structures. Soiltest, Inc., 4711 West North Avenue, Chicago 39, Ill.

Rubber waterstop. A new illustrated bulletin describes Aquastop, a rubber waterstop which has been engineered in both material and design to provide water-tightness in concrete expansion, contraction and construction joints, even under hydrostatic pressure. Tensile strength, flexibility and elasticity are also discussed. Several styles of the product are shown, along with a listing of sizes and illustrations of typical applications and information on field-splicing (such molded accessories as tees, unions, crosses, and ells are shown), as well as standard specification information which covers materials, installation requirements, sampling and testing. Presstite Division, American-Marietta Company, 39th and Chouteau Avenue, St. Louis 10, Mo.

Steel forms. Steel forms for square and octagonal pilings, bridge slabs and bridge girders are pictured in a folder on Watco steel forms. These forms are permanent, portable and interchangeable and enable the production of a great variety of uniformly accurate concrete sections. Plant City Welding and Tank Company, P. O. Box 1308, Plant City, Fla.

Dodson's Digest

The Big Story

Bob "Scoop" Cooper, a newspaper friend of mine, phoned the other day. Wanted me to join him on a helicopter tour of nearby construction on the interstate highway system.

Before you could say "Calcium Chloride," we were sailing over four brand-new lanes of concrete.

"You know, Dod, this interstate system is a fabulous thing," Bob bubbled, "41,000 miles of highways that'll cost $40 *billion* dollars. Wow!" Bob was a very excitable fellow.

"And Calcium Chloride is playing a mighty big role in the highway program, too," I injected.

"How's that?" Bob questioned.

"Well, many big contractors mix Calcium Chloride into their concrete to make it more workable and . . . "

Just then our pilot swooped low over a big crew laying concrete.

Bob snapped two fast photos and scribbled a half-dozen lines in his notebook. "What a story," he enthused. "Good thing there isn't much dust or my pictures would be lousy."

"That's because they've spread around a layer of Calcium Chloride," I answered.

"More Calcium Chloride? How come you're so sure?"

"That's the Thompson outfit – see his name on the side of the trucks? He uses it to keep the dust down around his construction sites and puts Calcium Chloride in his concrete to give it higher early strength, greater final strength and . . . "

"Dod," Bob exploded, "there's a terrific little story in this Calcium Chloride! Why, it's one of the keys to a better interstate system! Let's go back to the Thompson crew. I want to get some closeup shots of exactly how they use Calcium Chloride."

A few moments later we landed quite close to where Thompson's men were working. Bob had fire in his eyes . . . visions of another great story.

Before we could stop him, he grabbed his camera and jumped . . . right into nine inches of fresh concrete!

—L. D. DODSON

P.S. — Write for our booklet, "How To Make Better Concrete Products and Ready Mix." It's packed with facts and ideas telling how *you* can improve *your* concrete. *Wyandotte Chemicals Corporation, Wyandotte, Michigan. Offices in principal cities.*

Wyandotte CHEMICALS

WYANDOTTE

MICHIGAN ALKALI DIVISION
HEADQUARTERS FOR CALCIUM CHLORIDE

literature

Portable space heaters. Catalog 5815 gives specifications on nine different models of Stow portable space heaters. Models with built in thermostats are included along with information on selecting the correct size heater. Stow Manufacturing Company, 354 Shear Street, Binghamton, N. Y.

"Building a Highway." A 16-minute film makes you a roadside superintendent at one of the greatest shows on earth, picturing men and machines at work building the 41,000-mile National System of Interstate and Defense Highways, and thousands of other roads and streets. Construction steps are explained in simple language. How the Romans built their famous Via Appia and how, under rapidly changing traffic demands, America's roads grew from hunting trails into today's superhighways are included in the 16-mm. color film. Portland Cement Association, 33 West Grand Avenue, Chicago 10, Ill.

Equipment leasing. A new study entitled "The Pros and Cons of Equipment Leasing for Smaller Manufacturers, Department Stores, and Supermarkets" presents a complete discussion of the cost of leasing compared with outright purchase and purchase through conditional sales contract. Complete cost charts are used to illustrate the material. The advantages and disadvantages of equipment leasing in specific business situations encountered by smaller enterprises are set out in detail. Foundation for Management Research, 121 West Adams Street, Chicago 3, Ill.

Forming catalogues. Two fully illustrated catalogues describe a complete line of forming equipment for both residential and commercial construction. A 16-page booklet covers residential and light commercial forming, while a supplementary 4-page catalogue provides data on Simplex forms for heavier commercial applications. Complete panel and filler specifications, application drawings and photos, and full descriptions of standard and accessory items are included. Simplex Forms System, Inc., 5605 Industrial Avenue, Rockford, Ill.

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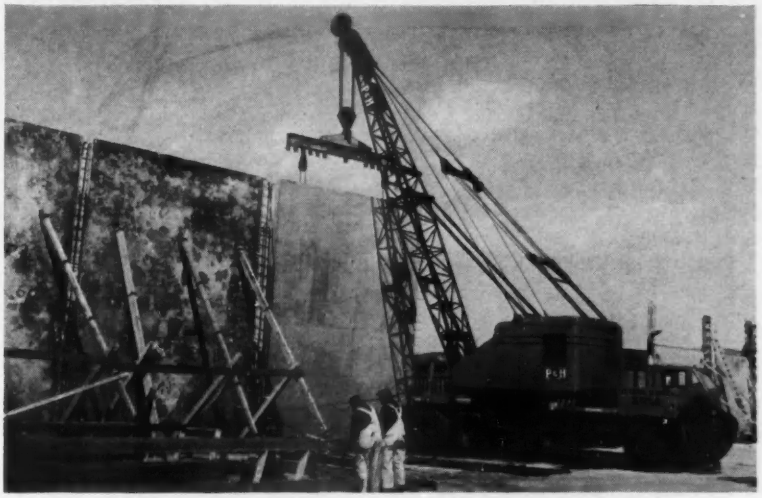

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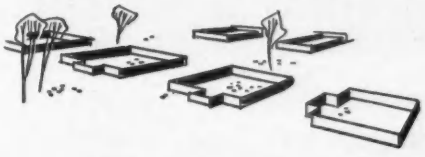
being used for 6000 HOME PROJECT



Elk Grove Village, Ill.

CENTEX CONSTRUCTION CO., INC.

LOV-LOK FORM SYSTEM is being used by the concrete subcontractor, IRVING C. PETERSON & CO., to set and pour up to eight foundations per day. This enables them to keep pace with the construction progress required for one of the largest home building projects in the country.

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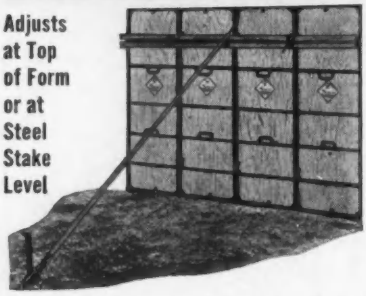
SYMONS Form Brace



Newest addition to Symons line . . . steel form brace. It is easily tied to pre-fab or built-up forms and to wooden or steel stakes. Once attached, brace can be adjusted at top of form or at stake level for positive alignment. Comes in regular lengths of 6′ and 10′6″. Brace extensions available.

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- ECONOMICAL—costs very little extra per square foot . . .
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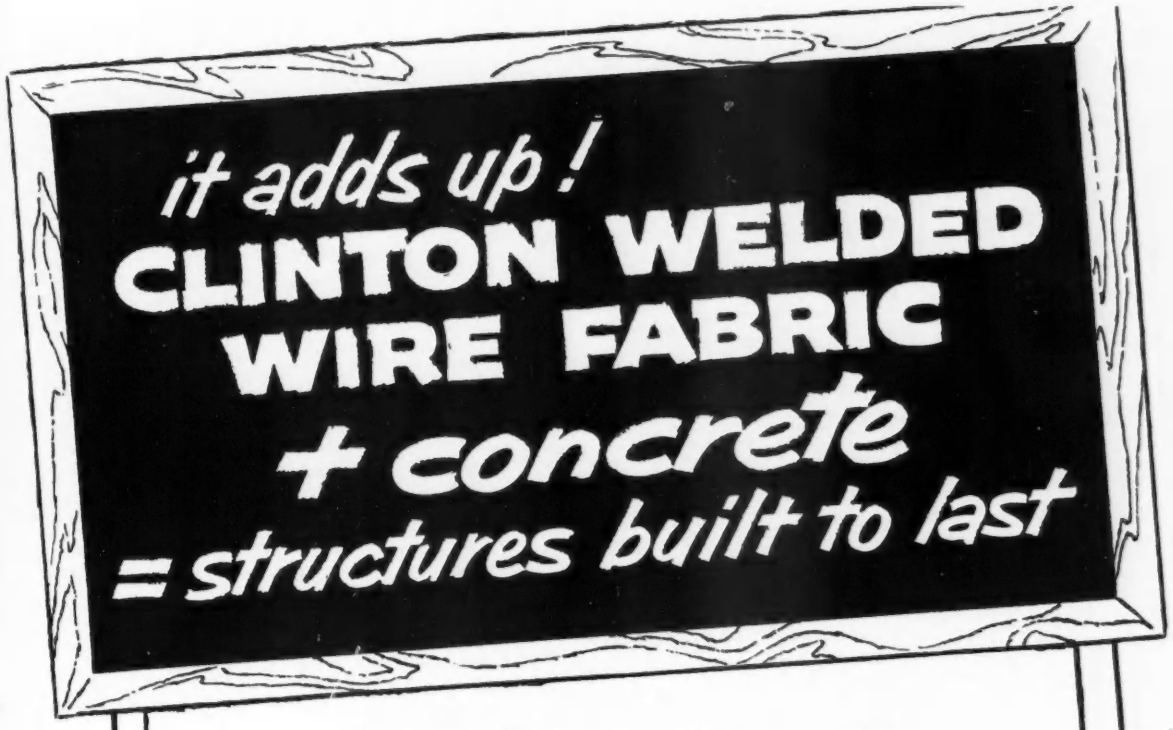

On construction sites across the country, you'll see CF&I-Clinton Welded Wire Fabric. Engineers specify its use because the steel fabric adds the strength of steel to the durability of concrete.

Contractors rely on CF&I-Clinton Welded Wire Fabric to distribute shrinkage stresses evenly to prevent cracking while concrete is setting. It also reduces warping and heaving caused by extreme temperature changes. Should a small crack develop, the steel fabric holds it together so that dirt or moisture cannot expand it.

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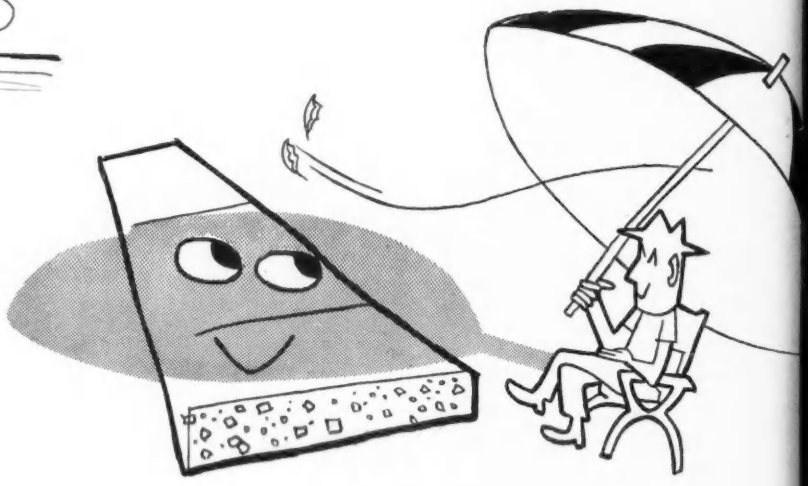
3 precautions for hot weather concreting

1. **DAMPEN SUBGRADE** thoroughly so ground does not absorb water out of freshly placed concrete



2. **PROVIDE SUNSHADE** after placing to protect concrete from the direct rays of the sun until it hardens sufficiently for finishing

3. **CURE IMMEDIATELY** with suitable curing compound, moisture-retaining covers, fog spray or soaked covers

YOUR LOCAL PRODUCER OF READY-MIXED CONCRETE